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HDP/SB/21 based on PTO/SB/21 (08-00)

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	**09/693,938**
Filing Date	October 23, 2000
Inventor(s)	Ashwin SAMPATH et al.
Group Art Unit	2685
Examiner Name	Charles C. Chow
Attorney Docket Number	29250-000958/US

ENCLOSURES *(check all that apply)*

- ☒ Fee Transmittal Form
  - ☒ Fee Attached
- ☐ Amendment
  - ☐ After Final
  - ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☐ Response to Missing Parts/ Incomplete Application
- ☐ Response to Missing Parts under 37 CFR 1.52 or 1.53
- ☐ Assignment Papers *(for an Application)*
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- ☐ Petition
- ☐ Petition to Convert to a Provisional Application
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- ☐ LETTER SUBMITTING APPEAL BRIEF AND APPEAL BRIEF (w/clean version of pending claims)
- ☒ Appeal Communication to Group (*Brief, in Triplicate*)
- ☐ Proprietary Information
- ☐ Status Letter
- ☐ Other Enclosure(s) *(please identify below)*:

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm *or* Individual name	Harness, Dickey & Pierce, P.L.C.	Attorney Name John E. Curtin	Reg. No. 37,602
Signature			
Date	October 25, 2004		

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PTO/SB/17 (10-01)
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FEE TRANSMITTAL for FY 2004

Patent fees are subject to annual revision.

TOTAL AMOUNT OF PAYMENT ($) **340.00**

Complete if Known	
Application Number	09/693,938
Filing Date	October 23, 2000
Inventor(s)	Ashwin SAMPATH et al.
Examiner Name	Charles C. Chow
Group Art Unit	2685
Attorney Docket No.	29250-000958/US

METHOD OF PAYMENT (check one)

1. ☒ The Commissioner is hereby authorized to charge indicated fees and credit any over payments to:

Deposit Account Number: 08-0750

Deposit Account Name: Harness, Dickey & Pierce, P.L.C.

☒ Charge Any Additional Fee Required Under 37 CFR 1.16 and 1.17

☐ Applicant claims small entity status. See 37 CFR 1.27

2. ☒ Payment Enclosed:

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FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1001	790	2001	395	Utility filing fee	
1002	350	2002	175	Design filing fee	
1003	550	2003	275	Plant filing fee	
1004	790	2004	395	Reissue filing fee	
1005	160	2005	80	Provisional filling fee	

SUBTOTAL (1) ($)

2. EXTRA CLAIM FEES

			Extra Claims		Fee from below	=	Fee Paid
Total Claims		-20 **		X		=	
Independent Claims		-3 **		X		=	
Multiple Dependent				X		=	

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
1202	18	2202	9	Claims in excess of 20
1201	88	2201	44	Independent claims in excess of 3
1203	300	2203	150	Multiple dependent claim, if not paid
1204	88	2204	44	** Reissue independent claims over original patent
1205	18	2205	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($)

**or number previously paid, if greater; For Reissues, see above

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet.	
1053	1053	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	55	Extension for reply within first month	
1252	430	2252	215	Extension for reply within second month	
1253	980	2253	490	Extension for reply within third month	
1254	1,530	2254	765	Extension for reply within fourth month	
1255	2,080	2255	1,040	Extension for reply within fifth month	
1401	340	2401	170	Notice of Appeal	
1402	340	2402	170	Filing a brief in support of an appeal	340
1403	300	2403	150	Request for oral hearing	
1451	1,510	1451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive – unavoidable	
1453	1,370	2453	685	Petition to revive – unintentional	
1501	1,370	2501	685	Utility issue fee (or reissue)	
1502	490	2502	245	Design issue fee	
1503	660	2503	330	Plant issue fee	
1460	130	1460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR 1.17 (q)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	790	2809	395	Filing a submission after final rejection (37 CFR § 1.129(a))	
1810	790	2810	395	For each additional invention to be examined (37 CFR § 1.129(b))	
1801	790	2801	395	Request for Continued Examination (RCE)	
1802	900	1802	900	Request for expedited examination of a design application	
				Other fee (specify) ____	

*Reduced by Basic Filing Fee Paid **SUBTOTAL (3)** ($)340.00

SUBMITTED BY

Complete *(if applicable)*

Name (Print/Type)	John E. Curtin	*Registration No. Attorney/Agent)*	37,602	*Telephone*	703-668-8000
Signature				*Date*	October 25, 2004

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OIPE JC190
OCT 25 2004
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appeal No. _____

Appellants:	Ashwin SAMPATH et al.
Application No.:	09/693,938
Group No.:	2685
Filed:	October 23, 2000
Examiner:	Charles C. Chow
For:	METHODS AND SYSTEMS FOR IMPROVING FRAME SELECTION IN WIRELESS COMMUNICATIONS NETWORKS
Attorney Docket No.:	29250-000958/US

BRIEF ON APPEAL ON BEHALF OF APPELLANT

U.S. Patent and Trademark Office
220 20th Street S.
Customer Window Mail Stop Appeal Brief - Patents
Crystal Plaza Two, Lobby, Room 1B03
Arlington, VA 22202

October 25, 2004

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iv. Whether or not the subject matter of claims 17, 30, 59 and 71 is obvious under 35 U.S.C. §103 based on a combination of Padovani, Eaton and U.S. Patent No. 6,226,283 to Neumiller et al.? 26

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ii. Neither Padovani nor Eaton disclose or suggest the generation of "enhanced frames" as required by the claims of the present invention. 28
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BRIEF ON BEHALF OF APPELLANT

In support of the Notice of Appeal filed August 27, 2004, appealing the Examiner's final rejection mailed May 27, 2004 of each of pending claims 1, 3, 4, 6-19, 21-23, 25, 27-32, 34-36, 38-45, 47, 48, 50-61, 63-65, 67, 69-73, 75-77 and 79-83 of the present application which appear in the attached Appendix, Appellant hereby provides the following remarks.

I. REAL PARTY IN INTEREST

The present application is assigned to Lucent Technologies Inc., by an Assignment recorded on October 23, 2000, Reel 011261, Frame 0267.

II. RELATED APPEALS AND INTERFERENCES

The Appellant does not know of any appeals or interferences which would directly affect or which would be directly affected by, or have a bearing on, the Board's decision in this Appeal.

III. STATUS OF THE CLAIMS

Claims 1, 3, 4, 6-19, 21-23, 25, 27-32, 34-36, 38-45, 47, 48, 50-61, 63-65, 67, 69-73, 75-77 and 79-83 reproduced in the attached Appendix A are the claims on Appeal. Each of these claims is currently pending in the application.

IV. STATUS OF ANY AMENDMENTS FILED SUBSEQUENT TO THE FINAL REJECTION

A Request for Reconsideration ("Request") dated August 17, 2004 (see Appendix B) was filed with the U.S. Patent Office in response to the Final Rejection dated May 27, 2004. For purposes of appeal, Applicants will presume that this Request will be considered and entered.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

The invention relates to techniques for improving "frame-selection" in wireless communication networks.

In Code Division Multiple Access (CDMA) wireless communications networks, data frames ("frames") transferred by network elements often comprise errors that degrade the quality of information exchanged within such networks. Therefore, it is often necessary to identify errors within frames and to process the frames according to their error content so that frames of sufficient quality are selected to be passed on to higher layers in the network's communication protocol ("layers"). In general, the identification of errors within frames and the processing and transferring of frames is known as frame selection.

CDMA wireless networks support so-called "soft handoffs". During a soft handoff, a primary frame and at least one copy of the primary frame, or "parallel" frame, are generated by different network elements. Before passing either the primary frame or the parallel frame on to higher layers in the network, it is necessary to determine which copy has superior quality. This is achieved by applying frame selection to each copy.

One example of a CDMA network is a Universal Mobile Telecommunications System ("UMTS") network. A UMTS network is based on 5 MHz Wideband CDMA ("W-CDMA") and is optimized for support of so-called "third generation services", which include multimedia-capable mobile communications. FIG. 1 (Appendix C) provides an exemplary diagram of a UMTS network 1 (see Specification, pages 1 and 2).

Referring to FIG. 1, (Appendix C) UMTS network "N" comprises core network 10, access network 20, mobile 30 (e.g., cellular telephone), Operations Administration and Maintenance ("OAM") unit 40, Public Switched Telephone Network ("PSTN")/Integrated Services Digital Network ("ISDN") 50, and Internet/Intranet Service Provider ("ISP") 60. Access network 20 comprises base stations 21a and 21b and network controllers or Serving Radio Network Controllers ("SRNCs") 22a and 22b. Base stations 21a and 21b communicate with SRNC 22a or 22b via wired links (known as "IUB interfaces") 3a and 3b. SRNCs 22a and 22b perform resource management functions and control base stations 21a and 21b, respectively, providing them access to core network 10. Frame selection units ("FSUs") 23a and 23b are located within SRNCs 22a and 22b, respectively, and are responsible for performing frame selection. Mobile 30 communicates with base stations 21a and 21b via wireless links 1a and 1b. SRNCs 22a and 22b communicate with each other via a wired link (known as an "IUR interface") 4 and communicate with the core network 10 via wired links (known as "IU interfaces") 5a and 5b. Core network 10 has connections 6, 7 and 8 to OAM unit 40, PSTN/ISDN 50 and ISP 60, respectively (see Specification, pages 2 and 3).

In UMTS network N, mobile 30 transmits signals in the form of frames to base stations 21a and/or 21b. Frames are transmitted at successive, fixed time increments. A single frame comprises data bits that make up part of a complete signal. These frames also comprise "transport blocks", which are basic units of data exchange. The size of a transport block (i.e., number of bits) is service-dependent. When a base station 21a or 21b receives a frame from mobile 30, the base station demodulates and decodes the frame to form a decoded frame. The base station 21a or 21b transfers the decoded frame to SRNC 22a or 22b at fixed time

increments. Each frame comprises at least one decoded transport block and important information about the data within the transport block. Frames transferred to the SRNC 22a or 22b may comprise errors generated during transmission or decoding. FSUs 23a or 23b within SRNC 22a or 22b are adapted to apply frame selection to the transferred frames to analyze errors within the frames and process the frames according to their error content (see Specification, page 3).

As noted above, frame selection is required when a mobile is in soft handoff (also called "diversity handover"). Soft handoff is designed to, among other things, enhance network quality by passing multiple copies of the same data to SRNCs. When mobile 30 is in a soft handoff mode, a primary base station 21a and at least one parallel base station 21b are in communication with the mobile 30. The primary base station 21a and parallel base station 21b both demodulate and decode a signal from the mobile 30. During a given time period, the primary base station 21a then transfers a primary frame to a primary SRNC 22a and then, if the parallel base station 21b is communicating with the primary SRNC 22a (which is not true in FIG. 1), the parallel base station 21b transfers a parallel frame (i.e., a frame, or "copy", decoded during the same time period and comprising its own decoded version of the same transport block and data as the primary frame) to that same SRNC 22a over an IUB interface. If the parallel base station 21b is communicating with a different, or parallel SRNC 22b (as shown in FIG. 1), the parallel base station 22b transfers the parallel frame to the parallel SRNC and the parallel SRNC 22b then transfers the parallel frame to the primary SRNC 22a over an IUR interface 4. FSU 23a within the primary SRNC 22a is thereafter responsible for applying frame selection to the received frames.

Frame selection is not, however, limited to soft-handoff conditions. Even when a mobile 30 is not in a soft handoff mode, an FSU 23a or 23b must determine if the received frames are of satisfactory quality. If the received frames comprise errors, the FSU 23a or 23b has to determine what action needs to be taken. For example, some services provided by the network may be able to make use of partially errored frames. This requires the FSU 23a or 23b to determine whether the quality of a frame exceeds a minimum threshold with respect to the nature of errors within the frame. Based on the outcome, the FSU 23a or 23b must then decide if the frame is to be passed on to higher layers in the network or discarded (see Specification, pages 4 and 5).

Existing frame selection methods typically involve determining a "metric" which will represent frame quality with adequate accuracy. A variety of "hard" metrics (i.e., measures of frame quality which indicate whether a frame is "good" or "bad") and "soft" metrics (i.e., measures of frame quality which indicate how good or bad a frame is based on a predetermined scale) have been studied. Cyclic redundancy check ("CRC") codes are examples of error detection codes that are based on a hard metric. In cases where CRCs are not used, other methods of error detection are necessary. These methods typically involve the comparison of a soft metric of frame quality to a predefined threshold. Based on results from CRCs or soft metrics, if at least one received copy of a frame is detected correctly, then the FSU 23a or 23b simply selects the correctly detected copy and sends it to a higher layer in the network. However, if each received copy of a frame comprises errors, the FSU 23a or 23b must discard the received copies, or select a "best" copy to pass on. In the case where FSU 23a or 23b selects a best copy and CRCs are used, FSU 23a or 23b must randomly select a copy, because there is no way to tell the relative quality of the copies. CRCs will indicate that a frame is "bad" even

when only a small part of a frame comprises errors. When soft metrics are used, FSU 23a or 23b cannot always select the copy having the highest quality because the results of soft metrics tend to be unreliable. The inability to tell the relative quality among copies of errored frames results in poor frame selection (see Specification, page 5).

It has been observed that errors in frames that are generated in wireless networks tend to form "error bursts". An error burst is a cluster, or burst, of errors that occur within a group of consecutive data bits in a frame. That is, error bursts are errors that tend to be concentrated within a group or multiple groups of consecutive bits, rather than scattered among singular bits. Errors occur in this manner because wireless channels vary slowly with time relative to typical data rates, and because of the inherent characteristics of convolutional code decoders or Turbo code decoders used in wireless networks. It is believed that knowledge of the fact that errors tend to be distributed in this manner can be used to provide more effective frame selection methods and systems.

Because errors often occur as error bursts, methods and systems for representing the location and length of errors to FSUs can be provided without using excessive amounts of IUB bandwidth. Furthermore, it is unlikely that error bursts will occur in the same parts of multiple frame copies. Therefore, it is believed that methods and systems can be provided for combining parts of frame copies to produce substantially error-free frames.

The present invention provides methods and systems for improving frame selection in wireless communication networks, based on the observation that errors in frames generated by wireless networks tend to form error bursts (see Specification, page 6).

The methods and systems of the present invention are particularly useful in UMTS networks, but may be applied in other, similar networks as well.

FIG. 2 (Appendix D) is a simplified representation of a UMTS sub-network N_1. Sub-network N_1 comprises access network 200 and mobile 300. Access network 200 comprises base station 201a and network controller or SRNC 202. SRNC 202 in turn comprises FSU 203.

Mobile 300 is adapted to sequentially transmit frames $F_{201a,0}$-$F_{201a,k}$ to base station 201a via wireless link 11a, where frame $F_{201a,0}$ is the first frame transmitted and $F_{201a,k}$ is the last frame transmitted. The term "k" within "$F_{201a,k}$ " is an integer variable corresponding to the sequence number of the last frame. Frames $F_{201a,0}$-$F_{201a,k}$ are transmitted at fixed time intervals (e.g., 10 milliseconds). Base station 201a is adapted to demodulate and decode a frame $F_{201a,0}$-$F_{201a,k}$ as it is received via an uplink within wireless link 11a.

In an illustrative embodiment of the present invention, decoding a frame $F_{201a,0}$-$F_{201a,k}$, comprises: identifying at least one error burst within the frame $F_{201a,0}$-$F_{201a,k}$ if the frame $F_{201a,0}$-$F_{201a,k}$ comprises at least one error burst; generating an "error burst representation" associated with the error burst; and storing the error burst representation (not shown) within the frame $F_{201a,0}$-$F_{201a,k}$. Collectively, the method just described can be referred to as an error recognition process. Base station 201a is thereafter adapted to transfer the frame $F_{201a,0}$-$F_{201a,k}$ to SRNC 202 via IUB interface 33a. The base station 201a is adapted to demodulate, decode and transfer the rest of frames $F_{201a,0}$-$F_{201a,k}$ as they are received in sequence. A more detailed description of how base station 201a decodes, stores an error burst representation and transfers a frame will now be provided (see Specification, page 10).

Consider the operation of base station 201a during a first time interval after receiving a frame $F_{201a,0}$. At this time, base station 201a is adapted to demodulate and decode frame $F_{201a,0}$. The format and content of frame $F_{201a,0}$ is as follows.

Referring to FIG. 3 (Appendix E), frame $F_{201a,0}$ comprises bytes Y_0-Y_n, which are arranged in horizontal rows. Each of bytes Y_0-Y_n comprises an eight-bit address, which comprises individual bits Z_0-Z_7. The bits Z_0-Z_7 are arranged in order from the lowest, or least significant bit ("LSB") Z_0, to the highest, or most significant bit ("MSB") Z_7. Frame $F_{201a,0}$ may also be viewed as comprising three main sections: header "H"; body "B"; and tail "T". Each of these sections comprise multiple "fields", each of which comprise a group of bits adapted to convey specific information.

Header H comprises the following fields: a mode field "M"; message identification field "ID"; and a frame number field "FN". Fields M and ID identify the frame, while the field FN refers to the frame number on which the transport block was received. Body B comprises the following fields: a decoded transport block field "TB"; a quality estimate field "QE" comprising information associated with radio link quality; a frame quality indicator field "FQ" adapted to store an error burst representation, which comprises information associated with an error burst that has occurred within the frame $F_{201a,0}$; a cyclic redundancy check field CRC; a transport format indicator field "TFI"; and a padding field "P". The transport block field TB comprises a decoded transport block.

It should be understood that the number of bits/bytes allocated for field FQ in this embodiment is merely for illustrative purposes. In general, the length of the field FQ may comprise any number of bits. Increasing the length of this field, however, yields increased IUB

bandwidth, which is utilized by overhead information rather than data. Optionally, fields QE and FQ may be combined to comprise a single field having a certain group of bits dedicated to radio link quality information and another group of bits dedicated to frame quality information. For purposes of this example, it is assumed that field FQ comprises a length of twelve bits (see Specification, pages 11 and 12).

Continuing, field CRC indicates the result of the cyclic redundancy check for the transport block – this field merely indicates whether the frame is "good" or "bad" (i.e., detected with or without errors) as received by base station 201a. Field TFI indicates the format that is being used to transport data. Field P comprises zero to seven bits, as required, in order to make the total number of bits within frame $F_{201a,0}$ an integer multiple of bytes. For purposes of this example, it is assumed that the frame $F_{201a,0}$ comprises eighty bits.

Tail T comprises a body check sum field "CSB" and a header check sum field "CSH". The check sum fields CSB and CSH indicate whether the SRNC 202 correctly received the body B and header H, respectively.

For purposes of this example, assume that frame $F_{201a,0}$ comprises probable error burst $E_{F201a,0}$, shown in FIG. 4 (Appendix F), which may have occurred either during transmission of frame $F_{201a,0}$ from the mobile 300 to the base station 201a or during decoding of $F_{201a,0}$ by the base station 201a. As shown in FIG. 4, frame $F_{201a,0}$ comprises eighty bits. Error burst $E_{F201a,0}$ is located within the first through tenth bits of frame $F_{201a,0}$ (see Specification, page 12).

Bit numbers in frame $F_{201a,0}$ may be derived/assigned by identifying a reference bit, such as bit Z_0 of byte Y_0 (see FIG. 3), as the first bit and counting forward through each bit of bytes

Y_0-Y_n. It should be understood that the location of error burst $E_{F201a,0}$ in FIG. 4 is by way of example only, as error bursts may occur within any part of frame $F_{201a,0}$.

Continuing with the operation of base station 201a, while frame $F_{201a,0}$ is being decoded, base station 201a is adapted to generate reliability information (known as "soft output information") associated with decoded bits within the frame $F_{201a,0}$. This soft output information, as its name implies, is based on a soft metric of frame quality. The soft output information may be generated using one of several known decoding methods. These decoding methods may comprise, for example, Viterbi soft output decoding for convolutional codes, MAP decoding for convolutional codes or soft output decoding for Turbo codes.

In an illustrative embodiment of the present invention, base station 201a is adapted to identify probable error burst $E_{F201a,0}$ based on the soft output information. In other words, base station 201a is adapted to determine specific bits within frame $F_{201a,0}$ that likely comprise error burst $E_{F201a,0}$. An error burst is referred to as "probable", because the results of soft output decoding are not 100% reliable due to "noise", meaning that error bursts may not always be accurately identified. As was just mentioned above, soft output information comprises information about the reliability of each bit within frame $F_{201a,0}$. Realizing this, the present inventors discovered that base stations, like base station 201a, can be adapted to identify a probable starting location and length of error burst $E_{F201a,0}$. More specifically, the inventors envision embodiments of the present invention where base stations, like base station 201a, are adapted to generate an error burst representation (hereafter "representation") $R_{F201a,0}$ associated with the starting location and the length of the error burst $E_{F201a,0}$. Therefore, base station 201a can be adapted to store the representation $R_{F201a,0}$ within frame $F_{201a,0}$. By storing representation

$R_{F201a,0}$ within frame $F_{201a,0}$, it can be said that base station 201a is adapted to generate an "enhanced" frame $F_{201a,0}$. In another embodiment of the present invention, base station 201a can be adapted to store representation $R_{F201a,0}$ within the frame quality indicator field FQ of enhanced frame $F_{201a,0}$ (see Specification, pages 13 and 14).

FIG. 5 (Appendix G) provides a further illustrative example of a representation $R_{F201a,0}$ stored within frame quality indicator field FQ. Referring to FIG. 5, the representation $R_{F201a,0}$ comprises an error-start indicator $u_{F201a,0}$ and an error-length indicator $v_{F201a,0}$. Error-start indicator $u_{F201a,0}$ comprises a first range of bits indicating the starting location (i.e., starting bit number) of the error burst $E_{F201a,0}$. Error-length indicator $v_{F201a,0}$ comprises a second range of bits indicating the length (i.e., number of bits) of the burst $E_{F201a,0}$. According to one embodiment of the invention, error-start indicator $u_{F201a,0}$ and error-length indicator $v_{F201a,0}$ comprise binary code.

As previously stated, each frame quality indicator field FQ comprises a length of twelve bits. This means that a representation $R_{F201a,0}$ comprising a length of 12 bits can be stored within a single field FQ. FIG. 5 depicts representation $R_{F201a,0}$ as a single row of bits. The representation $R_{F201a,0}$ is shown in this manner to simplify matters. In actuality, a representation will have to be formatted to fit a field FQ. In the example shown in FIG. 3, this will require the use of two consecutive rows of bits, because each row of bits is limited to one byte (see Specification, pages 14 and 15).

Because frame $F_{201a,0}$ comprises eighty bits, the error-start indicator $u_{F201a,0}$ comprises enough bits to represent any error burst which starts at any bit within the frame $F_{201a,0}$ (i.e., 2^7-1 = 127 > 80) and to accurately indicate the starting location of error burst $E_{F201a,0}$. The error-length

indicator $v_{201a,0}$ comprises the remaining number of bits within the field FQ, or five bits. Thus, the error-length indicator $v_{F201a,0}$ comprises enough bits to accurately indicate any error burst having a length of up to thirty-two bits (i.e., $2^5 = 32$) and to accurately represent the length of the respective error burst $E_{F201a,0}$. It should be understood that the particular allocation of bits for the frame quality indicator field FQ and for indicators $u_{F201a,0}$ and $v_{F201a,0}$ is by way of example only. Field FQ and indicators $u_{F201a,0}$ and $v_{F201a,0}$ may be made larger or smaller than the lengths provided in this example based upon the typical frame size, bandwidth and processing limitations and/or accuracy requirements for error representations in a specific communications service.

Backtracking somewhat, the methods and systems for identifying and representing error bursts envisioned by the present invention work well whether or not base stations use CRC codes. For example, according to one embodiment of the invention, base station 201a can be adapted to use a CRC code to determine whether frames such as frames $F_{201a,0}$-$F_{201a,k}$ comprise error bursts. In such an embodiment, the CRC code simply uses a binary digit (i.e., "0" or "1") to indicate whether or not the frame comprises errors. The CRC code does not provide any information about the characteristics, such as location or length, of error bursts. When the CRC code indicates that a frame does not comprise errors, base station 201a can be adapted so that it does not generate a representation such as representation $R_{F201a,0}$. When the CRC code indicates that a frame, however, comprises errors, base station 201a can be adapted to use soft output information, as previously described, to identify an error burst such as error burst $E_{F201a,0}$. Base station 201a is then adapted to generate a representation such as representation $R_{F201a,0}$ (see Specification, pages 15 and 16).

It may occur, however, that base station 201a is not adapted to use a CRC code at all. In this event, base station 201a is adapted to reserve an "all-zeroes" value of an error burst representation to indicate that frames are error-free. Any value other than "all-zeroes" indicates an error burst. Therefore, FSU 203 can be adapted to determine whether frames comprise error bursts based on the presence or absence of an "all-zeroes" value.

Referring back to FIG. 2, once the representation $R_{F201a,0}$ has been stored within enhanced frame $F_{201a,0}$, base station 201a is adapted to transfer the enhanced frame $F_{201a,0}$ to SRNC 202 via an IUB interface 33a. After SRNC 202 has received the enhanced frame $F_{201a,0}$, FSU 203 is adapted to process the enhanced frame $F_{201a,0}$ based on its error content. More specifically, FSU 203 is adapted to evaluate a frame quality (hereafter "quality") of the enhanced frame $F_{201a,0}$ by analyzing representation $R_{F201a,0}$. FSU 203 is then adapted to determine whether to accept the enhanced frame $F_{201a,0}$ (e.g., pass the frame on to higher layers in the network). According to one embodiment of the invention, FSU 203 is adapted to evaluate the quality of enhanced frame $F_{201a,0}$ by setting a threshold frame quality (hereafter "threshold") and determining the quality of enhanced frame $F_{201a,0}$ based on the length of error burst $E_{F201a,0}$. According to one embodiment of the invention, the threshold can be associated with a reference error burst length and the quality of frame $F_{201a,0}$ can be evaluated based on the length of error burst $E_{F201a,0}$. Continuing, if the quality of enhanced frame $F_{201a,0}$ is above the threshold, the FSU 203 is adapted to pass the enhanced frame $F_{201a,0}$ on to higher layers in the network. If the quality of the enhanced frame $F_{201a,0}$ is below the threshold, the FSU 203 is adapted to discard the enhanced frame $F_{201a,0}$ and to request a replacement copy of the frame from the base station 201a. Mobile 300 is then adapted to transfer a replacement copy of the enhanced frame $F_{201a,0}$ to base station 201a. Base station

201a is thereafter adapted to transfer an enhanced replacement copy (not shown) of the frame $F_{201a,0}$, which comprises an error burst representation, to SRNC 202. The replacement copy of the enhanced frame $F_{201a,0}$ comprises the same data and format as frame $F_{201a,0}$ (but not necessarily the same errors). FSU 203 is then adapted to repeat substantially the same process as described above with respect to the replacement copy (see Specification, pages 16 and 17).

Because representation $R_{F201a,0}$ comprises information about the probable location and length of error burst $E_{F201a,0}$, FSU 203 can be adapted to determine, with some degree of probability, the specific fields and sections within the frame $F_{201a,0}$ that contain errors. Thus FSUs, such as FSU 203, envisioned by the present invention can be adapted to select superior quality frames with greater reliability than existing FSUs. More particularly, FSU 203 can be adapted use the representation $R_{F201a,0}$ and the known format of enhanced frame $F_{201a,0}$ to identify the fields and/or sections in which the error burst $E_{F201a,0}$ is probably located (i.e., "location") and to determine the number of bits in those fields and/or sections that contain errors. FSU 203 can therefore be adapted to set an adjustable threshold associated with one of a plurality of reference error burst lengths and reference error burst locations (i.e., a reference error burst length can be adjusted based on the fields and/or sections in which an error burst is located). FSU 203 can be further adapted to evaluate the quality of enhanced frame $F_{201a,0}$ based on the location and length of error burst $E_{F201a,0}$. Evaluating the quality of enhanced frame $F_{201a,0}$ in this manner effectively "weighs" fields and/or sections according to their importance (see Specification, pages 17 and 18).

According to yet another embodiment of the invention, FSU 203 can be adapted to generate a "combined" frame. The process of generating a combined frame can also be called

"partial-frame combining". In this embodiment of the invention, a combined frame is a frame that is generated by combining an "acceptable" portion (i.e., a portion comprising a minimal amount of errors) of an enhanced frame and an acceptable portion of at least one copy of the enhanced frame. In an ideal case, the acceptable portions are error-free and combining the acceptable portions generates an error-free, combined frame. However, it should be understood that it is not always possible to generate an error-free, combined frame. The ability to generate an error-free, combined frame depends on the distribution of error bursts within particular enhanced frames and enhanced frame copies. Even though an error-free, combined frame cannot always be generated, partial-frame combining often results in the generation of a combined frame that is of higher quality than an original enhanced frame (see Specification, page 18).

In embodiments of the present invention that comprise partial-frame combining, FSU 203 is first adapted to evaluate the quality of an enhanced frame such as enhanced frame $F_{201a,0}$ in one of the ways described in the above embodiments. FSU 203 is then adapted to pass the enhanced frame on to higher layers if the quality of the enhanced frame is above the threshold. If the quality of enhanced frame $F_{201a,0}$ is below the threshold, FSU 203 is adapted to request at least one copy of the enhanced frame ("enhanced frame copy") from mobile 300 via base station 201a.

Assuming that the quality of enhanced frame $F_{201a,0}$ is below the threshold and that the FSU 203 must then request an enhanced frame copy, mobile 300 is adapted to transfer a frame copy $C_{201a,0}$ to base station 201a in substantially the same way as previously described with respect to frame $F_{201a,0}$. Frame copy $C_{201a,0}$ is shown in FIG. 2 and FIG. 6 (Appendix H), and comprises the same data, structure and format (but not necessarily the same errors) as frame

$F_{201a,0}$. Base station 201a is then adapted to demodulate and decode the frame copy $C_{201a,0}$ and to identify a probable error burst $E_{C201a,0}$ within the frame copy $C_{201a,0}$ using substantially the same process described above with respect to frame $F_{201a,0}$ (see Specification, pages 18 and 19).

As shown in FIG. 7 (Appendix I), probable error burst $E_{C201a,0}$ is located within the twentieth through thirty-second bits of frame copy $C_{201a,0}$. Base station 201a is adapted to generate an enhanced frame copy $C_{201a,0}$ using substantially the same process as used to generate enhanced frame $F_{201a,0}$. Enhanced frame copy $C_{201a,0}$ comprises frame copy error burst representation $R_{C201a,0}$, shown in FIG. 8 (Appendix J), associated with the starting location and length of error burst $E_{C201a,0}$. Representation $R_{C201a,0}$ comprises error-start indicator $u_{C201a,0}$ and error length indicator $v_{C201a,0}$. Indicators $u_{C201a,0}$ and $v_{C201a,0}$ are analogous to indicators $u_{F201a,0}$ and $v_{F201a,0}$. Continuing, base station 201a is adapted to transfer the enhanced frame copy $C_{201a,0}$ to SRNC 202 (see Specification, page 19).

When SRNC 202 receives the enhanced frame copy $C_{201a,0}$, FSU 203 is adapted to evaluate the quality of the enhanced frame copy $C_{201a,0}$ by analyzing representation $R_{C201a,0}$ and to further process enhanced frame copy $C_{201a,0}$ in substantially the same way as described above with respect to enhanced frame $F_{201a,0}$. If the quality of the enhanced frame copy $C_{201a,0}$ is above a threshold, FSU 203 is adapted to pass the enhanced frame copy $C_{201a,0}$ on. If the quality of the enhanced frame copy is below the threshold, FSU 203 is adapted to generate a "combined" frame by combining an acceptable portion of the enhanced frame $F_{201a,0}$ with an acceptable portion of the enhanced frame copy $C_{201a,0}$.

Assuming that the quality of enhanced frame copy $C_{201a,0}$ is below the threshold, FSU 203 is adapted to generate a combined frame. The specifics relating to how a combined frame is

generated from an enhanced frame, such as frame $F_{201a,0}$, and an enhanced frame copy, such as copy $C_{201a,0}$, can be better understood through the use of the following example.

Referring to FIG. 9 (Appendix K), FSU 203 is adapted to identify an acceptable portion $A_{F201a,0}$ of frame $F_{201a,0}$ by analyzing representation $R_{F201a,0}$. Acceptable portion $A_{F201a,0}$ comprises the eleventh through eightieth bits of the frame $F_{201a,0}$. At the same time, FSU 203 is adapted to identify an acceptable portion $A_{C201a,0}$ of frame copy $C_{201a,0}$ by analyzing representation $R_{C201a,0}$. Acceptable portion $A_{C201a,0}$ comprises the first through tenth bits of the frame copy $C_{201a,0}$. FSU 203 is then adapted to combine acceptable portions $A_{F201a,0}$ and $A_{C201a,0}$ to construct a combined frame $F_{R1,0}$ (see Specification, page 20).

If the quality of the combined frame $F_{R1,0}$ is above the threshold, the combined frame $F_{R1,0}$ is passed on. If the quality of the combined frame $F_{R1,0}$ is below the threshold, FSU 203 is adapted to request a second frame copy (not shown) comprising the same data as the frame $F_{201a,0}$, and is adapted to repeat substantially the same frame selection process as described above using the second frame copy. In the current example, combined frame $F_{R1,0}$ is error-free. Therefore, even if FSU 203 sets an extremely high threshold, combined frame $F_{R1,0}$ will be passed on to higher layers in the network.

Partial-frame combining is not limited to situations in which there is a single enhanced frame and a single enhanced frame copy. A combined frame can be generated from an enhanced frame and multiple enhanced frame copies as well. Accordingly, FSU 203 can be adapted to request multiple frame copies, such as frame copy $C_{201a,0}$. FSU 203 can then be adapted to identify and combine acceptable portions, such as acceptable portions $A_{F201a,0}$ and $A_{C201a,0}$, of an

enhanced frame and multiple enhanced frame copies to construct a combined frame, such as frame $F_{R1,0}$.

Partial-frame combining is particularly useful when a mobile is in a soft handoff mode. FIG. 10 (Appendix L) is a simplified representation of soft-handoff communications within a communications sub-network N_2 that comprises access network 200 and mobile 300, according to one embodiment of the present invention. It should be noted that FIG. 10 uses similar reference numbers as in FIG. 2. This is done to indicate the use of components or devices adapted to carry out some of the same features and functions described above. Access network 200 comprises primary base station 201a, parallel base station 201b and SRNC 202. Base station 201b is a novel base station comprising features and functions identical to those of base station 201a. SRNC 202 comprises FSU 203 (see Specification, pages 21 and 22).

During soft hand-off, a primary base station and at least one parallel base station communicate simultaneously with the mobile 300. Mobile 300 is adapted to simultaneously transmit primary frames $F_{201a,0}$-$F_{201a,k}$ to primary base station 201a and transmit "parallel" frames $F_{201b,0}$-$F_{201b,k}$ to parallel base station 201b via wireless link 11b. For purposes of this embodiment, primary frames $F_{201a,0}$-$F_{201a,k}$ are the same as frames $F_{201a,0}$-$F_{201a,k}$ of FIG. 2. Parallel frames $F_{201b,0}$-$F_{201b,k}$ are counterparts of primary frames $F_{201a,0}$-$F_{201a,k}$. A primary frame $F_{201a,0}$-$F_{201a,k}$ transmitted to base station 201a and a parallel frame $F_{201b,0}$-$F_{201b,k}$ transmitted to base station 201b during the same time interval comprise the same data, or transport blocks. Thus, it can be said that primary frames $F_{201a,0}$-$F_{201a,k}$ and parallel frames $F_{201b,0}$-$F_{201b,k}$ are "copies" of one another (i.e., frame $F_{201a,0}$ and frame $F_{201b,0}$ are copies of each other, and so on). However, the copies may not be identical due to transmission and/or decoding errors. It should

be noted that, although base station 201a is designated as a primary base station and base station 201b is designated as a parallel base station in this example, either of base stations 201a and 201b can be either a primary base station or a parallel base station in other examples.

Consider the operation of sub-network N_2 with respect to a primary frame $F_{201a,0}$ and a parallel frame $F_{201b,0}$. Primary frame $F_{201a,0}$ is shown in FIG. 3. Parallel frame $F_{201b,0}$ is shown in FIG. 11 (Appendix M) and comprises the same data, structure and format as primary frame $F_{201a,0}$. Primary frame $F_{201a,0}$ comprises probable error burst $E_{F201a,0}$, as previously described and shown in FIG. 4. Parallel frame $F_{201b,0}$ comprises an error burst $E_{F201b,0}$ located within the twentieth through thirty-second bits of parallel frame $F_{201b,0}$. Error burst $E_{F201b,0}$ is shown in FIG. 12 (Appendix N) (see Specification, pages 22 and 23).

In FIG. 10, base stations 201a and 201b operate in substantially the same way as base station 201a operates in the embodiment shown in FIG. 2. Base station 201a is adapted to generate an enhanced primary frame $F_{201a,0}$, comprising a stored primary frame error burst representation $R_{F201a,0}$, in the same manner as described above. Representation $R_{F201a,0}$ is shown in FIG. 5. Base station 201b is adapted to generate an enhanced frame $F_{201b,0}$, comprising a stored parallel frame error burst representation $R_{F201b,0}$, in the same manner as described with respect to enhanced frame $F_{201a,0}$. Representation $R_{F201b,0}$, shown in FIG. 13 (Appendix O), comprises an error-start indicator $u_{F201b,0}$ and an error-length indicator $v_{F201b,0}$. Indicators $u_{F201b,0}$ and $v_{F201b,0}$ are analogous to indicators $u_{F201a,0}$ and $v_{F201a,0}$ of representation $R_{F201a,0}$. Once primary frame $F_{201a,0}$ and parallel frame $F_{201b,0}$ comprise their respective representations, they can be referred to as enhanced primary frame $F_{201a,0}$ and enhanced parallel frame $F_{201b,0}$.

Base stations 201a and 201b are adapted to transfer enhanced primary frame $F_{201a,0}$ and enhanced parallel frame $F_{201b,0}$, respectively, to SRNC 202 via IUR interface 33b. Upon receiving enhanced primary frame $F_{201a,0}$ and enhanced parallel frame $F_{201b,0}$, FSU 203 is adapted to apply frame selection comprising partial-frame combining. The specifics of how this is done will now be described in detail.

FSU 203 is first adapted to evaluate the quality of enhanced primary frame $F_{201a,0}$ and enhanced parallel frame $F_{201b,0}$ by analyzing representations $R_{F201a,0}$ and $R_{F201b,0}$, respectively. The quality of frames $F_{201a,0}$ and $F_{201b,0}$ is evaluated in one of the ways described in the above embodiments. If the quality of the enhanced primary frame $F_{201a,0}$ is above a threshold and the quality of the enhanced parallel frame $F_{201b,0}$ is below the threshold, the FSU 203 is adapted to pass the primary frame on. If the quality of enhanced primary frame $F_{201a,0}$ is below the threshold, and the quality of the enhanced parallel frame $F_{201b,0}$ is above the threshold, FSU 203 is adapted to pass the enhanced parallel frame $F_{201b,0}$ on. If the qualities of enhanced primary frame $F_{201a,0}$ and enhanced parallel frame $F_{201b,0}$ are above the threshold, FSU 203 is adapted to pass the superior quality frame between frames $F_{201a,0}$ and $F_{201b,0}$ on. On the other hand, if the qualities of the enhanced primary frame $F_{201a,0}$ and the enhanced parallel frame $F_{201b,0}$ are below the threshold, FSU 203 is adapted to generate a combined frame (see Specification, pages 23 and 24).

Assuming that the qualities of enhanced primary frame $F_{201a,0}$ and enhanced parallel frame $F_{201b,0}$ are below the threshold, FSU 203 is adapted to generate a combined frame by combining an acceptable portion of the enhanced primary frame $F_{201a,0}$ with an acceptable portion of the enhanced parallel frame $F_{201b,0}$. Referring to FIG. 14 (Appendix P), FSU 203 is

adapted to identify acceptable portion $A_{F201a,0}$ of frame $F_{201a,0}$ and an acceptable portion $A_{F201b,0}$ of frame $F_{201b,0}$ by analyzing representations $R_{F201a,0}$ and $A_{F201b,0}$, respectively. In this example, acceptable portion $A_{F201a,0}$ comprises the eleventh through eightieth bits of frame $F_{201a,0}$ and acceptable portion $A_{F201b,0}$ comprises the first through tenth bits of frame $F_{201b,0}$. Continuing, FSU 203 is adapted to combine acceptable portions $A_{F201a,0}$ and $A_{F201b,0}$ to generate a combined frame $F_{R2,0}$ (see Specification, page 24).

If the combined frame $F_{R2,0}$ is above the threshold quality, FSU 203 is adapted to pass the combined frame on to higher layers in the network. If the combined frame $F_{R2,0}$ is below the threshold quality, FSU 203 is adapted to discard the combined frame $F_{R2,0}$ and to request a copy of the primary frame and a copy of the parallel frame from base stations 201a and 201b, respectively. An enhanced copy of the primary frame (not shown) and an enhanced copy of the parallel frame (not shown) are then transferred to SRNC 202 in the same manner as enhanced frame copy $C_{201a,0}$ is transferred in an embodiment of FIG. 2. FSU 203 is then adapted to re-apply substantially the same process to the enhanced copy of the primary frame and the enhanced copy of the parallel frame.

The sub-network N_2 shown in FIG. 10 comprises two base stations 201a and 201b in communication with mobile 300. It should be understood, however, that the invention is not limited to this embodiment. It is possible for a mobile such as mobile 300 to communicate with more than two such base stations during soft-handoff operation. In such a situation, an FSU, such as FSU 203, would receive an enhanced primary frame and more than two enhanced parallel frames. Thereafter, FSU 203 could be adapted to carry out partial-frame combining

wherein acceptable portions of the enhanced primary frame and enhanced parallel frames are combined to construct a combined frame.

The effectiveness of the present methods and systems for applying frame selection depends upon the length of the frame quality indicator field FQ (which must be limited to prevent a significant reduction in frame processing and transmission rates) with respect to the size of a corresponding enhanced frame, such as frames $F_{201a,0}$ and $F_{201b,0}$. This is particularly true when generating combined frames. In order to construct an error-free frame, such as frames $F_{R1,0}$ and $F_{R2,0}$, it is necessary to: identify all error bursts that occur within enhanced frames and enhanced frame copies; generate representations similar to representations $R_{F201a,0}$, $R_{F201b,0}$ and $R_{C201a,0}$ for all of the error bursts; and combine acceptable portions, such as acceptable portions of the frames based upon the representations. One problem exists when an enhanced frame or enhanced frame copy is relatively large and its frame quality indicator field FQ is relatively short. In this case, it may not be possible to represent all potential starting locations of error bursts or it may not be possible to accurately represent long error bursts. There simply may not be enough bits within the frame quality indicator field FQ to fully represent all potential errors. Depending on the particular allocation of bits for an error-start indicator and an error-length indicator, an error burst representation may only be capable of representing the starting location of an error burst which starts within a limited range of bits within the frame and/or may only be able to represent a segment of an error burst, as opposed to its entire length (see Specification, pages 25 and 26).

Furthermore, another problem may occur when enhanced frames comprise multiple error bursts. According to other embodiments of the invention, base stations 201a and 201b are

adapted to generate and store multiple error burst representations such as representations $R_{F201a,0}$ and $R_{F201b,0}$ within the frame quality indicator field FQ of a particular enhanced frame in order to represent multiple error bursts. However, limitations on the size of the field FQ may make it difficult or impractical to accurately represent multiple error bursts. Despite the potential problems associated with representing error bursts, partial-frame combining envisioned by the present invention will often result in generating a combined frame of significantly improved quality.

According to other embodiments of the invention, problems associated with fully representing error bursts are addressed by applying "unequal error recovery". Unequal error recovery comprises minimizing errors only within the most critical fields and/or sections of an enhanced frame. For example, the header H (see FIG. 3) is usually the most critical section. The loss of a header H may corrupt an entire voice burst for audio services, or an entire picture for video services (see Specification, pages 26 and 27).

According to one embodiment of the invention, base stations 201a and 201b can be adapted to recognize situations in which they cannot fully or accurately represent error bursts within an enhanced frame. In such situations, base stations 201a and 201b can be adapted to generate and store an error burst representation that is associated only with a particular field or section, such as header H, of an enhanced frame such as frames $F_{201a,0}$, and $F_{201b,0}$. For example, in constant bit-rate services such as audio and video, the header H has a fixed location (usually at the beginning of a frame) and a fixed length. It is therefore easy to identify the header H prior to the generation of an error burst representation and to provide greater protection against error bursts that occur within the header H. Since the header H comprises significantly fewer bits than

an entire frame, it is likely that a frame quality indicator field FQ will not have to be excessively long in order to store one or more error burst representations which fully and accurately represent all error bursts that occur within the header H (see Specification, page 27).

Accordingly, FSU 203 can be adapted to process frames using unequal error recovery. According to an additional embodiment of the network N_1 shown in FIG. 2, FSU 203 can be adapted to evaluate the quality of an enhanced frame, such as enhanced frame $F_{201a,0}$, based on the quality of a particular field or section (e.g., header H) within the enhanced frame. According to yet another embodiment of sub-network N_1, FSU 203 can be adapted to generate a combined frame by combining an acceptable portion within a particular field or section (e.g., header H) of an enhanced primary frame, similar to portion $A_{F201a,0}$ of frame $F_{201a,0}$, and an acceptable portion within the same field or section of an enhanced frame copy, similar to portion $A_{C201a,0}$ of frame $C_{201a,0}$. Similarly, according to an additional embodiment of the sub-network N_2 shown in FIG. 10, FSU 203 can be adapted to generate a combined frame by combining an acceptable portion within a particular field or section (e.g., header H) of an enhanced primary frame, similar to portion $A_{F201a,0}$ of frame $F_{201a,0}$, and an acceptable portion within the same field or section of an enhanced parallel frame, similar to portion $A_{F201b,0}$ of frame $F_{201b,0}$.

Applying unequal error recovery does more than reduce bit-error rates. It also improves decoding performance by focusing error recovery resources (e.g., processing space and time) only on the most critical sections of frames. Such resources are not wasted on less critical sections of the frames.

Novel base stations and FSUs envisioned by the present invention may comprise a number of devices. For example, base stations 201a and 201b may comprise programmed

devices such as microprocessors and/or memory units, or one or more integrated circuits ("ICs") adapted to, among other things, generate error burst representations, such as representations $R_{F201a,0}$, $R_{F201b,0}$ and $R_{C201a,0}$, and adapted to store the representations within enhanced frames and enhanced frame copies, such as frames $R_{F201a,0}$, $R_{F201b,0}$ and frame copy $C_{F201a,0}$. Likewise, FSU 203 may comprise programmed devices such as microprocessors and/or memory units, or one or more ICs adapted to perform the same features, functions and processes described in the various embodiments of the present invention above. In addition, base stations 201a and 201b and FSU 203 may comprise programmed mediums, such as hard disks, floppy disks or CD-ROMs, which comprise program code for performing substantially the same features, functions and processes of the present invention. The program code may further comprise customized subroutines, which can be altered based on various characteristics of the communications network (see Specification, pages 28 and 29).

The present invention provides reduced error rates and improved frame selection performance by generating, storing and analyzing novel representations of error bursts. According to the present invention, frame selection is further improved by generating novel combined frames. Although the present invention focuses on frame selection in wireless communications networks, the invention is not so limited. The methods and systems of the present invention are useful in any communications network or device that makes use of partially errored frames. Further advantages of the present invention will be readily apparent to those skilled in the art (see Specification, page 29).

VI. ISSUES TO BE REVIEWED ON APPEAL

i. Whether or not the subject matter of claims 1, 3-7, 10-15, 18-19, 21-23, 25, 27, 28, 31, 32, 34-36, 38-45, 47, 48, 50, 51, 54-57, 60, 61, 63-65, 67, 69, 72, 72, 75-77 and 79-83 is obvious under 35 U.S.C. §103(a) based on a combination of U.S. Patent No. 6,222,830 to Padovani et al. ("Padovani") in view of U.S. Patent No. 5,886,645 to Eaton ("Eaton")?

ii. Whether or not the subject matter of claims 8, 9, 52 and 53 is obvious under 35 U.S.C. §103 based on a combination of Padovani and U.S. Patent No. 5,490,153 to Gregg et al. ("Gregg")?

iii. Whether or not the subject matter of claims 16, 29, 58 and 70 is obvious under 35 U.S.C. §103 based on a combination of Padovani, Eaton and U.S. Patent No. 5,974,584 to Hendrickson et al. ("Hendrickson")?

iv. Whether or not the subject matter of claims 17, 30, 59 and 71 is obvious under 35 U.S.C. §103 based on a combination of Padovani, Eaton and U.S. Patent No. 6,226,283 to Neumiller et al. ("Neumiller")?

VII. ARGUMENTS

A. The Section 103 Rejections of All Claims Except 8, 9, 32 and 53

Each of the claims, except for claims 8, 9 and 52-53, were rejected using a combination of: (a) Padovani and Eaton; or (b) Padovani and Eaton along with another reference, i.e., either Hendrickson or Neumiller.

Each of the independent claims of the present invention (and, therefore, each claim) requires: (a) generating at least: (i) one enhanced frame; and (ii) at least one enhanced frame copy; and (b) combining acceptable portions of the enhanced frame and enhanced frame copy

based on error burst representations to form a combined frame of higher quality than the original enhanced frame at least during a soft-handoff.

As the Examiner has acknowledged previously, Padovani does not disclose the generation of an enhanced frame and an enhanced frame copy. To overcome this deficiency, the Examiner relies on Eaton.

i. <u>There is no motivation to combine Padovani and Eaton.</u>

The present invention is directed at the generation of an enhanced frame which may, for example, be used in a soft handoff of a wireless device. Though Padovani does not disclose other claimed features of the present invention, as applicants presently understand Padovani, it does disclose soft handoffs. In contrast, Eaton is wholly unrelated to soft handoffs. Instead, Eaton is related to the transmission of duplicate frames within a paging system in order to retransmit some or all information which was not received during an initial transmission.

It is respectfully submitted that there is no suggestion or motivation within Padovani to make use of the duplicate transmissions disclosed in Eaton. Likewise, there is no suggestion or motivation in Eaton to use the soft handoff techniques disclosed in Padovani. Therefore, applicants respectfully submit that one of ordinary skill in the art would not have been motivated to combine Padovani and Eaton to arrive at the claims of the present invention at the time the application was filed. As such, the above-referenced claims are not rendered obvious by such a combination.

ii. <u>Neither Padovani nor Eaton disclose or suggest the generation of "enhanced frames" as required by the claims of the present invention.</u>

As described at least on page 14 of the specification, an enhanced frame is one which includes an error burst representation indicative of the probable starting location, and length of, a

given error burst. There is no disclosure or suggestion in either Padovani or Eaton for such an enhanced frame. Therefore, even if one were to combine Padovani and Eaton, such a combination would lack an element of applicants' recited claims. Applicants respectfully request that the Board reverse the decision of the Examiner and allow claims 1, 3-7, 10-15, 18-19, 21-23, 25, 27, 28, 31, 32, 34-36, 38-45, 47, 48, 50, 51, 54-57, 60, 61, 63-65, 67, 69, 72, 72, 75-77 and 79-83

iii. **Given the Deficiencies of Padovani and Eaton, the Rejections using Hendrickson and Neumiller should also be reversed.**

Applicants respectfully submit that all of the rejections based on a combination of Padovani and Eaton, including those that rely on either Hendrickson or Neumiller, should be reversed because none of these combinations discloses or suggests the generation of an enhanced frame and an enhanced frame copy, as in the claims of the present invention as discussed above.

B. **The Section 103 Rejections of Claims 8, 9, 32 and 53**

Claims 8, 9, 52 and 53 were rejected under 35 U.S.C. §103(a) as being unpatentable over Padovani in view of Gregg. Applicants respectfully submit that the combination of Padovani and Gregg does not disclose or suggest combining an acceptable portion of an enhanced frame with an acceptable portion of an enhanced frame copy based on an error burst representation in each frame to form a combined frame of a higher quality than an enhanced frame, where the error burst representation comprises an error start indicator and an error length indicator, as in the claims of the present invention.

Accordingly, applicants respectfully request that the Board reverse the decision of the Examiner and allow claims 8, 9, 52 and 53.

IX. CONCLUSION

Accordingly, for at least the aforementioned reasons, Appellants respectfully request the Honorable Members of the Board of Patent Appeals and Interferences to reverse each of the outstanding rejections in connection with the present application and allow each of claims 1, 3, 4, 6-19, 21-23, 25, 27-32, 34-36, 38-45, 47, 48, 50-61, 63-65, 67, 69-73, 75-77 and 79-83 to be allowed in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No.08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

HARNESS, DICKEY, & PIERCE, P.L.C.

By: _____

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Reston, Virginia 20195
(703) 668-8000

JEC:psy

Enclosures: Three (3) copies of Appellant's Brief
Appendix A - Clean Version of Claims
Appendix B - Copy of Request for Reconsideration dated August 17, 2004
Appendix C - Figure 1
Appendix D - Figure 2
Appendix E - Figure 3
Appendix F - Figure 4
Appendix G - Figure 5
Appendix H - Figure 6
Appendix I - Figure 7
Appendix J - Figure 8

Appendix K - Figure 9
Appendix L - Figure 10
Appendix M - Figure 11
Appendix N - Figure 12
Appendix O - Figure 13
Appendix P - Figure 14

APPENDIX A

1. (Previously Presented) A frame selection system adapted to:

generate at least one enhanced frame comprising at least one error burst representation;

generate at least one enhanced frame copy comprising at least one error burst representation;

combine an acceptable portion of the enhanced frame with an acceptable portion of the enhanced frame copy based on the error burst representations to form a combined frame of a higher quality than the enhanced frame at least during a soft-handoff.

2. (Cancelled)

3. (Previously Presented) The system of claim 1 further adapted to generate a primary enhanced frame.

4. (Previously Presented) The system of claim 1 further adapted to generate a parallel enhanced frame.

5. (Cancelled)

6. (Previously Presented) The system of claim 1 further adapted to store each of the error burst representations within a respective frame.

7. (Previously Presented) The system of claim 6 further adapted to store each of the error burst representations within a respective frame quality indicator field.

8. (Previously Presented) The system of claim 1 wherein each of the error burst representations comprises an error-start indicator and an error-length indicator.

9. (Previously Presented) The system of claim 8, wherein each of the error-start indicators and the error-length indicators comprise binary code.

10. (Previously Presented) The system of claim 1, wherein the system comprises a wireless communications base station.

11. (Previously Presented) The system of claim 1, wherein the error burst representations are associated with a field or section of a respective frame.

12. (Previously Presented) The system of claim 1 further adapted to evaluate a frame quality of the enhanced frame.

13. (Previously Presented) The system of claim 12 further adapted to analyze at least one error burst representation within the enhanced frame.

14. (Previously Presented) The system of claim 12 further comprising a frame selection unit.

15. (Previously Presented) The system of claim 1 further adapted to:

accept the enhanced frame if a frame quality of the enhanced frame is above a threshold; and

discard the enhanced frame and request a replacement copy of the enhanced frame if the frame quality of the enhanced frame is below the threshold.

16. (Original) The system of claim 15, wherein the threshold is associated with a reference error burst length.

17. (Original) The system of claim 15, wherein the threshold comprises an adjustable threshold associated with one of a plurality of reference error burst lengths and reference error burst locations.

18. (Previously Presented) The system of claim 12 further adapted to evaluate the frame quality of the enhanced frame based on a quality of a field or section of the enhanced frame.

19. (Original) The system of claim 12 wherein the device is further adapted to generate a combined frame.

20. (Cancelled)

21. (Previously Presented) The system of claim 1 further adapted to combine an acceptable portion of an enhanced primary frame with an acceptable portion of an enhanced parallel frame.

22. (Previously Presented) The system of claim 1 further adapted to combine an acceptable portion from a field or section of the enhanced frame and an acceptable portion from a same field or section of the enhanced frame copy.

23. (Previously Presented) The system of claim 1 further adapted to combine an acceptable portion from a field or section of an enhanced primary frame and an acceptable portion from a same field or section of an enhanced parallel frame.

24. (Cancelled)

25. (Previously Presented) A device adapted to analyze at least one error burst representation within an enhanced frame;

analyze at least one error burst representation within an enhanced frame;

analyze at least one error burst representation within an enhanced frame copy;

combine an acceptable portion of the enhanced frame with an acceptable portion of the enhanced frame copy based on the respective error burst representations to form a combined frame of higher quality than the enhanced frame at least during a soft-handoff.

26. (Cancelled)

27. (Previously Presented) The device of claim 25, wherein the device comprises a frame selection unit.

28. (Previously Presented) The device of claim 25, further adapted to:

accept the enhanced frame if a frame quality of the enhanced frame is above a threshold; and

discard the enhanced frame and request a replacement copy of the enhanced frame if the frame quality of the enhanced frame is below the threshold.

29. (Original) The device of claim 28, wherein the threshold is associated with a reference error burst length.

30. (Original) The device of claim 28, wherein the threshold comprises an adjustable threshold associated with one of a plurality of reference error burst lengths and reference error burst locations.

31. (Previously Presented) The device of claim 25, further adapted to evaluate a frame quality of the enhanced frame based on a quality of a field or section of the enhanced frame.

32. (Original) The device of claim 25, further adapted to generate a combined frame.

33. (Cancelled)

34. (Previously Presented) The device of claim 25 further adapted to combine an acceptable portion of an enhanced primary frame with an acceptable portion of an enhanced parallel frame.

35. (Previously Presented) The device of claim 25 further adapted to combine an acceptable portion from a field or section of the enhanced frame and an acceptable portion from a same field or section of the enhanced frame copy.

36. (Previously Presented) The device of claim 25 further adapted to combine an acceptable portion from a field or section of an enhanced primary frame and an acceptable portion from a same field or section of an enhanced parallel frame.

37. (Cancelled)

38. (Cancelled)

39. (Previously Presented) A device adapted to combine an acceptable portion of an enhanced frame comprising at least one error burst representation that includes an error start indicator and error length indicator with an acceptable portion of an enhanced frame copy based on an error burst representation within each frame to form a combined frame of a higher quality than the enhanced frame at least during a soft-handoff.

40. (Previously Presented) The device of claim 39 further adapted to combine an acceptable portion of an enhanced primary frame with an acceptable portion of an enhanced parallel frame.

41. (Previously Presented) The device of claim 39 further adapted to combine an acceptable portion from a field or section of the enhanced frame and an acceptable portion from a same field or section of the enhanced frame copy.

42. (Previously Presented) The device of claim 39 further adapted to combine an acceptable portion from a field or section of an enhanced primary frame and an acceptable portion from a same field or section of an enhanced parallel frame.

43. (Previously Presented) The device as in claim 39 further adapted to:

evaluate a frame quality of the enhanced frame based on a quality of a field or section of the enhanced frame; and

evaluate a frame quality of the enhanced frame copy based on a quality of a field or section of the enhanced frame copy.

44. (Previously Presented) The device of claim 43, wherein the device comprises a frame selection unit.

45. (Previously Presented) A frame selection method comprising:

generating at least one enhanced frame comprising at least one error burst representation;

generating at least one enhanced frame copy comprising at least one error burst representation;

combining an acceptable portion of the enhanced frame with an acceptable portion of the enhanced frame copy based on the error burst representations to form a combined frame of a higher quality than the enhanced frame at least during a soft-handoff.

46. (Cancelled)

47. (Original) The method of claim 45, further comprising generating an enhanced primary frame.

48. (Original) The method of claim 45, further comprising generating an enhanced parallel frame.

49. (Cancelled)

50. (Previously Presented) The method of claim 45 further comprising storing each of the error burst representations within a respective frame.

51. (Previously Presented) The method of claim 50, further comprising storing each of the error burst representations within a respective frame quality indicator field.

52. (Previously Presented) The method of claim 45 wherein each of the error burst representations comprises an error-start indicator and an error-length indicator.

53. (Previously Presented) The method of claim 52, wherein each of the error-start indicators and the error-length indicators comprise binary code.

54. (Previously Presented) The method of claim 45 wherein the error burst representations are associated with a particular field or section of a respective frame.

55. (Previously Presented) The method of claim 45 further comprising evaluating a frame quality of the enhanced frame.

56. (Previously Presented) The method of claim 55, further comprising analyzing the at least one error burst representation within the enhanced frame.

57. (Original) The method of claim 55, further comprising:

accepting the enhanced frame if the frame quality of the enhanced frame is above a threshold; and

discarding the enhanced frame and requesting a replacement copy of the enhanced frame if the frame quality of the enhanced frame is below the threshold.

58. (Original) The method of claim 57, wherein the threshold is associated with a reference error burst length.

59. (Original) The method of claim 57, wherein the threshold comprises an adjustable threshold associated with one of a plurality of reference error burst lengths and reference error burst locations.

60. (Original) The method of claim 55, further comprising evaluating the frame quality of the enhanced frame based on a quality of a field or section of the enhanced frame.

61. (Previously Presented) The method of claim 45 further comprising generating a combined frame.

62. (Cancelled)

63. (Previously Presented) The method of claim 45 further comprising an acceptable portion of an enhanced primary frame with an acceptable portion of an enhanced parallel frame.

64. (Previously Presented) The method of claim 45 further comprising combining an acceptable portion from a field or section of the enhanced frame and an acceptable portion from a same field or section of the enhanced frame copy.

65. (Previously Presented) The method of claim 45 further comprising combining an acceptable portion from a field or section of an enhanced primary frame and an acceptable portion from a same field or section of an enhanced parallel frame.

66. (Cancelled)

67. (Previously Presented) A frame selection method comprising:

analyzing at least one error burst representation within an enhanced frame;

analyzing at least one error burst representation within an enhanced frame copy;

combining an acceptable portion of the enhanced frame with an acceptable portion of the enhanced frame copy based on the error burst representations to form a combined frame of a higher quality than the enhanced frames at least during a soft-handoff.

68. (Cancelled)

69. (Previously Presented) The method of claim 67, further comprising:

accepting the enhanced frame if a frame quality of the enhanced frame is above a threshold; and

discarding the enhanced frame and requesting a replacement copy of the enhanced frame if the frame quality of the enhanced frame is below the threshold.

70. (Original) The method of claim 69, wherein the threshold is associated with a reference error burst length.

71. (Original) The method of claim 69, wherein the threshold comprises an adjustable threshold associated with one of a plurality of reference error burst lengths and reference error burst locations.

72. (Previously Presented) The method of claim 67, further comprising evaluating a frame quality of the enhanced frame based on a quality of a field or section of the enhanced frame.

73. (Original) The method of claim 67, further comprising generating a combined frame.

74. (Cancelled)

75. (Previously Presented) The method of claim 67 further comprising combining an acceptable portion of an enhanced primary frame with an acceptable portion of an enhanced parallel frame.

76. (Previously Presented) The method of claim 67 further comprising combining an acceptable portion from a field or section of the enhanced frame and an acceptable portion from a same field or section of the enhanced frame copy.

77. (Previously Presented) The method of claim 67 further comprising combining an acceptable portion from a field or section of an enhanced primary frame and an acceptable portion from a same field or section of an enhanced parallel frame.

78. (Cancelled)

79. (Previously Presented) A method comprising combining an acceptable portion of an enhanced frame comprising at least one error burst representation that includes an error start indicator and an error length indicator with an acceptable portion of an enhanced frame copy based on an error burst representation within each frame to form a combined frame of a higher quality than the enhanced frame at least during a soft-handoff.

80. (Previously Presented) The method of claim 79 further comprising combining an acceptable portion of an enhanced primary frame with an acceptable portion of an enhanced parallel frame.

81. (Previously Presented) The method of claim 79 further comprising combining an acceptable portion from a field or section of the enhanced frame and an acceptable portion from a same field or section of the enhanced frame copy.

82. (Previously Presented) The method of claim 79 further comprising combining an acceptable portion from a field or section of an enhanced primary frame and an acceptable portion from a same field or section of an enhanced parallel frame.

83. (Previously Presented) The method of claim 79 further comprising:

evaluating a frame quality of the enhanced frame based on a quality of a field or section of the enhanced frame; and

evaluating a frame quality of the enhanced frame copy based on a quality of a field or section of the enhanced frame copy.

OIPE JC190 OCT 25 2004 PATENT & TRADEMARK OFFICE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.:	09/693,938
Filing Date:	October 23, 2000
Applicant:	Ashwin SAMPATH et al.
Group Art Unit:	2685
Examiner:	Charles C. Chow
Title:	METHODS AND SYSTEMS FOR IMPROVING FRAME SELECTION IN WIRELESS COMMUNICATIONS NETWORKS
Attorney Docket:	29250-000958/US

BOX AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

August 17, 2004

REQUEST FOR RECONSIDERATION

Sir:

Applicants are in receipt of the Final Office Action dated May 27, 2004 ("Final Office Action") and respond as follows.

Remarks begin on page 16 of this paper.

IN THE CLAIMS

Kindly amend claims 1, 14, 25, 27, 39, 44, 45, 67 and 79. Kindly delete claim 38 without prejudice to, or disclaimer of, the subject matter contained therein. The changes to claims 14, 25 (in part), 27 and 44 were made to correct stylistic errors and are, therefore, not related to patentability.

The following is a complete listing of revised claims with a status identifier in parenthesis.

LISTING OF CLAIMS

1. (Currently Amended) A frame selection system adapted to:

generate at least one enhanced frame comprising at least one error burst representation;

generate at least one enhanced frame copy comprising at least one error burst representation;

combine an acceptable portion of the enhanced frame with an acceptable portion of the enhanced frame copy based on the error burst representations to form a combined frame of a higher quality than the enhanced frame <u>at least during a soft-handoff</u>.

2. (Cancelled)

3. (Previously Presented) The system of claim 1 further adapted to generate a primary enhanced frame.

4. (Previously Presented) The system of claim 1 further adapted to generate a parallel enhanced frame.

5. (Cancelled)

6. (Previously Presented) The system of claim 1 further adapted to store each of the error burst representations within a respective frame.

7. (Previously Presented) The system of claim 6 further adapted to store each of the error burst representations within a respective frame quality indicator field.

8. (Previously Presented) The system of claim 1 wherein each of the error burst representations comprises an error-start indicator and an error-length indicator.

9. (Previously Presented) The system of claim 8, wherein each of the error-start indicators and the error-length indicators comprise binary code.

10. (Previously Presented) The system of claim 1, wherein the system comprises a wireless communications base station.

11. (Previously Presented) The system of claim 1, wherein the error burst representations are associated with a field or section of a respective frame.

12. (Previously Presented) The system of claim 1 further adapted to evaluate a frame quality of the enhanced frame.

13. (Previously Presented) The system of claim 12 further adapted to analyze at least one error burst representation within the enhanced frame.

14. (Currently Amended) The system of claim 12 further comprising ~~an FSU~~ a frame selection unit.

15. (Previously Presented) The system of claim 1 further adapted to:

accept the enhanced frame if a frame quality of the enhanced frame is above a threshold; and

discard the enhanced frame and request a replacement copy of the enhanced frame if the frame quality of the enhanced frame is below the threshold.

16. (Original) The system of claim 15, wherein the threshold is associated with a reference error burst length.

17. (Original) The system of claim 15, wherein the threshold comprises an adjustable threshold associated with one of a plurality of reference error burst lengths and reference error burst locations.

18. (Previously Presented) The system of claim 12 further adapted to evaluate the frame quality of the enhanced frame based on a quality of a field or section of the enhanced frame.

19. (Original) The system of claim 12 wherein the device is further adapted to generate a combined frame.

20. (Cancelled)

21. (Previously Presented) The system of claim 1 further adapted to combine an acceptable portion of an enhanced primary frame with an acceptable portion of an enhanced parallel frame.

22. (Previously Presented) The system of claim 1 further adapted to combine an acceptable portion from a field or section of the enhanced frame and an acceptable portion from a same field or section of the enhanced frame copy.

23. (Previously Presented) The system of claim 1 further adapted to combine an acceptable portion from a field or section of an enhanced primary frame and an acceptable portion from a same field or section of an enhanced parallel frame.

24. (Cancelled)

25. (Currently Amended) A device adapted to analyze at least one error burst representation within an enhanced frame;

analyze at least one error burst representation within an enhanced frame;

analyze at least one error burst representation within an enhanced frame copy;

combine an acceptable portion of the enhanced frame ~~within~~ with an acceptable portion of the enhanced frame copy based on the respective error

burst representations to form a combined frame of higher quality than the enhanced frame at least during a soft-handoff.

26. (Cancelled)

27. (Currently Amended) The device of claim 25, wherein the device comprises ~~an FSU~~ a frame selection unit.

28. (Previously Presented) The device of claim 25, further adapted to:

accept the enhanced frame if a frame quality of the enhanced frame is above a threshold; and

discard the enhanced frame and request a replacement copy of the enhanced frame if the frame quality of the enhanced frame is below the threshold.

29. (Original) The device of claim 28, wherein the threshold is associated with a reference error burst length.

30. (Original) The device of claim 28, wherein the threshold comprises an adjustable threshold associated with one of a plurality of reference error burst lengths and reference error burst locations.

31. (Previously Presented) The device of claim 25, further adapted to evaluate a frame quality of the enhanced frame based on a quality of a field or section of the enhanced frame.

32. (Original) The device of claim 25, further adapted to generate a combined frame.

33. (Cancelled)

34. (Previously Presented) The device of claim 25 further adapted to combine an acceptable portion of an enhanced primary frame with an acceptable portion of an enhanced parallel frame.

35. (Previously Presented) The device of claim 25 further adapted to combine an acceptable portion from a field or section of the enhanced frame and an acceptable portion from a same field or section of the enhanced frame copy.

36. (Previously Presented) The device of claim 25 further adapted to combine an acceptable portion from a field or section of an enhanced primary frame and an acceptable portion from a same field or section of an enhanced parallel frame.

37. (Cancelled)

38. (Cancelled)

39. (Currently Amended) A device adapted to combine an acceptable portion of an enhanced frame <u>comprising at least one error burst representation that includes an error start indicator and error length indicator</u> with an acceptable portion of an enhanced frame copy based on an error burst

representation within each frame to form a combined frame of a higher quality than the enhanced frame at least during a soft-handoff.

40. (Previously Presented) The device of claim 39 further adapted to combine an acceptable portion of an enhanced primary frame with an acceptable portion of an enhanced parallel frame.

41. (Previously Presented) The device of claim 39 further adapted to combine an acceptable portion from a field or section of the enhanced frame and an acceptable portion from a same field or section of the enhanced frame copy.

42. (Previously Presented) The device of claim 39 further adapted to combine an acceptable portion from a field or section of an enhanced primary frame and an acceptable portion from a same field or section of an enhanced parallel frame.

43. (Previously Presented) The device as in claim 39 further adapted to:

evaluate a frame quality of the enhanced frame based on a quality of a field or section of the enhanced frame; and

evaluate a frame quality of the enhanced frame copy based on a quality of a field or section of the enhanced frame copy.

44. (Currently Amended) The device of claim 43, wherein the device comprises ~~an FSU~~ a frame selection unit.

45. (Currently Amended) A frame selection method comprising:

generating at least one enhanced frame comprising at least one error burst representation;

generating at least one enhanced frame copy comprising at least one error burst representation;

combining an acceptable portion of the enhanced frame with an acceptable portion of the enhanced frame copy based on the error burst representations to form a combined frame of a higher quality than the enhanced frame at least during a soft-handoff.

46. (Cancelled)

47. (Original) The method of claim 45, further comprising generating an enhanced primary frame.

48. (Original) The method of claim 45, further comprising generating an enhanced parallel frame.

49. (Cancelled)

50. (Previously Presented) The method of claim 45 further comprising storing each of the error burst representations within a respective frame.

51. (Previously Presented) The method of claim 50, further comprising storing each of the error burst representations within a respective frame quality indicator field.

52. (Previously Presented) The method of claim 45 wherein each of the error burst representations comprises an error-start indicator and an error-length indicator.

53. (Previously Presented) The method of claim 52, wherein each of the error-start indicators and the error-length indicators comprise binary code.

54. (Previously Presented) The method of claim 45 wherein the error burst representations are associated with a particular field or section of a respective frame.

55. (Previously Presented) The method of claim 45 further comprising evaluating a frame quality of the enhanced frame.

56. (Previously Presented) The method of claim 55, further comprising analyzing the at least one error burst representation within the enhanced frame.

57. (Original) The method of claim 55, further comprising:

accepting the enhanced frame if the frame quality of the enhanced frame is above a threshold; and

discarding the enhanced frame and requesting a replacement copy of the enhanced frame if the frame quality of the enhanced frame is below the threshold.

58. (Original) The method of claim 57, wherein the threshold is associated with a reference error burst length.

59. (Original) The method of claim 57, wherein the threshold comprises an adjustable threshold associated with one of a plurality of reference error burst lengths and reference error burst locations.

60. (Original) The method of claim 55, further comprising evaluating the frame quality of the enhanced frame based on a quality of a field or section of the enhanced frame.

61. (Previously Presented) The method of claim 45 further comprising generating a combined frame.

62. (Cancelled)

63. (Previously Presented) The method of claim 45 further comprising an acceptable portion of an enhanced primary frame with an acceptable portion of an enhanced parallel frame.

64. (Previously Presented) The method of claim 45 further comprising combining an acceptable portion from a field or section of the enhanced frame and an acceptable portion from a same field or section of the enhanced frame copy.

65. (Previously Presented) The method of claim 45 further comprising combining an acceptable portion from a field or section of an enhanced primary

frame and an acceptable portion from a same field or section of an enhanced parallel frame.

66. (Cancelled)

67. (Currently Amended) A frame selection method comprising:

analyzing at least one error burst representation within an enhanced frame;

analyzing at least one error burst representation within an enhanced frame copy;

combining an acceptable portion of the enhanced frame with an acceptable portion of the enhanced frame copy based on the error burst representations to form a combined frame of a higher quality than the enhanced frames at least during a soft-handoff.

68. (Cancelled)

69. (Previously Presented) The method of claim 67, further comprising:

accepting the enhanced frame if a frame quality of the enhanced frame is above a threshold; and

discarding the enhanced frame and requesting a replacement copy of the enhanced frame if the frame quality of the enhanced frame is below the threshold.

70. (Original) The method of claim 69, wherein the threshold is associated with a reference error burst length.

71. (Original) The method of claim 69, wherein the threshold comprises an adjustable threshold associated with one of a plurality of reference error burst lengths and reference error burst locations.

72. (Previously Presented) The method of claim 67, further comprising evaluating a frame quality of the enhanced frame based on a quality of a field or section of the enhanced frame.

73. (Original) The method of claim 67, further comprising generating a combined frame.

74. (Cancelled)

75. (Previously Presented) The method of claim 67 further comprising combining an acceptable portion of an enhanced primary frame with an acceptable portion of an enhanced parallel frame.

76. (Previously Presented) The method of claim 67 further comprising combining an acceptable portion from a field or section of the enhanced frame and an acceptable portion from a same field or section of the enhanced frame copy.

77. (Previously Presented) The method of claim 67 further comprising combining an acceptable portion from a field or section of an enhanced primary

frame and an acceptable portion from a same field or section of an enhanced parallel frame.

78. (Cancelled)

79. (Currently Amended) A method comprising combining an acceptable portion of an enhanced frame comprising at least one error burst representation that includes an error start indicator and an error length indicator with an acceptable portion of an enhanced frame copy based on an error burst representation within each frame to form a combined frame of a higher quality than the enhanced frame at least during a soft-handoff.

80. (Previously Presented) The method of claim 79 further comprising combining an acceptable portion of an enhanced primary frame with an acceptable portion of an enhanced parallel frame.

81. (Previously Presented) The method of claim 79 further comprising combining an acceptable portion from a field or section of the enhanced frame and an acceptable portion from a same field or section of the enhanced frame copy.

82. (Previously Presented) The method of claim 79 further comprising combining an acceptable portion from a field or section of an enhanced primary frame and an acceptable portion from a same field or section of an enhanced parallel frame.

83. (Previously Presented) The method of claim 79 further comprising:

evaluating a frame quality of the enhanced frame based on a quality of a field or section of the enhanced frame; and

evaluating a frame quality of the enhanced frame copy based on a quality of a field or section of the enhanced frame copy.

REMARKS

Applicants wish to thank the Examiner for the courtesies extended to their attorney during an in-person interview on August 17, 2004.

Each of the remaining claims, except for claims 8, 9 and 52-53, were rejected using some combination of U.S. Patent No. 6,222,830 to Padovani et al. ("Padovani"), and U.S. Patent No. 5,886,645 to Eaton ("Eaton") along with another reference (e.g., Hendrickson et al. ("Hendrickson") and Neumiller et al ("Neumiller")) which was previously cited in an earlier Office Action.

Applicants respectfully disagree and traverse these rejections for at least the following reasons.

Each of the independent claims, and therefore each of the claims, requires: (a) generating at least: (i) one enhanced frame; and (ii) at least one enhanced frame copy; and (b) combining acceptable portions of the enhanced frame and enhanced frame copy based on error burst representations to form a combined frame of higher quality than the original enhanced frame at least during a soft-handoff.

As the Examiner has acknowledged previously, Padovani does not disclose the generation of an enhanced frame and an enhanced frame copy. To overcome this deficiency, the Examiner now cites Eaton.

Applicants submit that both the combination of Padovani and Eaton, and the combination of Padovani and Eaton with either Hendrickson or Neumiller, are improper for at least the following reason.

The present invention is directed at the generation of an enhanced frame which may, for example, be used in a soft handoff of a wireless device. Though Padovani does not disclose features of the present invention, as applicants presently understand Padovani, it does disclose soft handoffs. In contrast, Eaton is wholly unrelated to soft handoffs. Instead, Eaton is related to the transmission of duplicate frames within a paging system in order to retransmit some or all information which was not received during an initial transmission.

It is respectfully submitted that there is no suggestion or motivation within Padovani to make use of the duplicate transmissions disclosed in Eaton. Likewise, there is no suggestion or motivation in Eaton to use the soft handoff techniques disclosed in Padovani. Therefore, applicants respectfully submit that one of ordinary skill in the art would not have been motivated to combine Padovani and Eaton to arrive at the claims of the present invention at the time the application was filed.

In addition, neither Padovani nor Eaton disclose the generation of "enhanced frames" as required by the claims of the present invention. As described at least on page 14 of the specification, an enhanced frame is one which includes an error burst representation indicative of the probable starting location, and length of, a given error burst. There is no disclosure or

suggestion in either Padovani or Eaton for such an enhanced frame. Therefore, even if one were to combine Padovani and Eaton, such a combination would be lacking an element of applicants' recited claims. Accordingly, applicants respectfully submit that all of the rejections based on a combination of Padovani and Eaton with or without additional references should be withdrawn because neither of these combinations discloses or suggests generation of an enhanced frame and an enhanced frame copy, as in the claims of the present invention.

Claim 8, 9, 52 and 53 were rejected under 35 U.S.C. §103(a) as being unpatentable over Padovani in view of U.S. Patent No. 5,490,153 to Gregg et al. ("Gregg"). Applicants respectfully incorporate their reply to a previous Office Action wherein applicants stated that this rejection was inappropriate because Gregg does not teach or disclose or suggest combining a portion of an enhanced frame with a portion of an enhanced frame copy based on an error burst representation in each frame to form a combined frame of a higher quality than an enhanced frame with an error burst representation comprising an error start indicator and an error length indicator, as in the claims of the present invention.

Accordingly, applicants respectfully request withdrawal of the pending rejection and allowance of claims 8, 9, 52 and 53.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact John E. Curtin at the telephone number of the undersigned below.

In the event this Response does not place the present application in condition for allowance, applicant requests the Examiner to contact the undersigned at (703) 668-8000 to schedule a personal interview.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

HARNESS, DICKEY, & PIERCE, P.L.C.

By _____

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OIPE JC130
OCT 25 2004
PATENT & TRADEMARK OFFICE

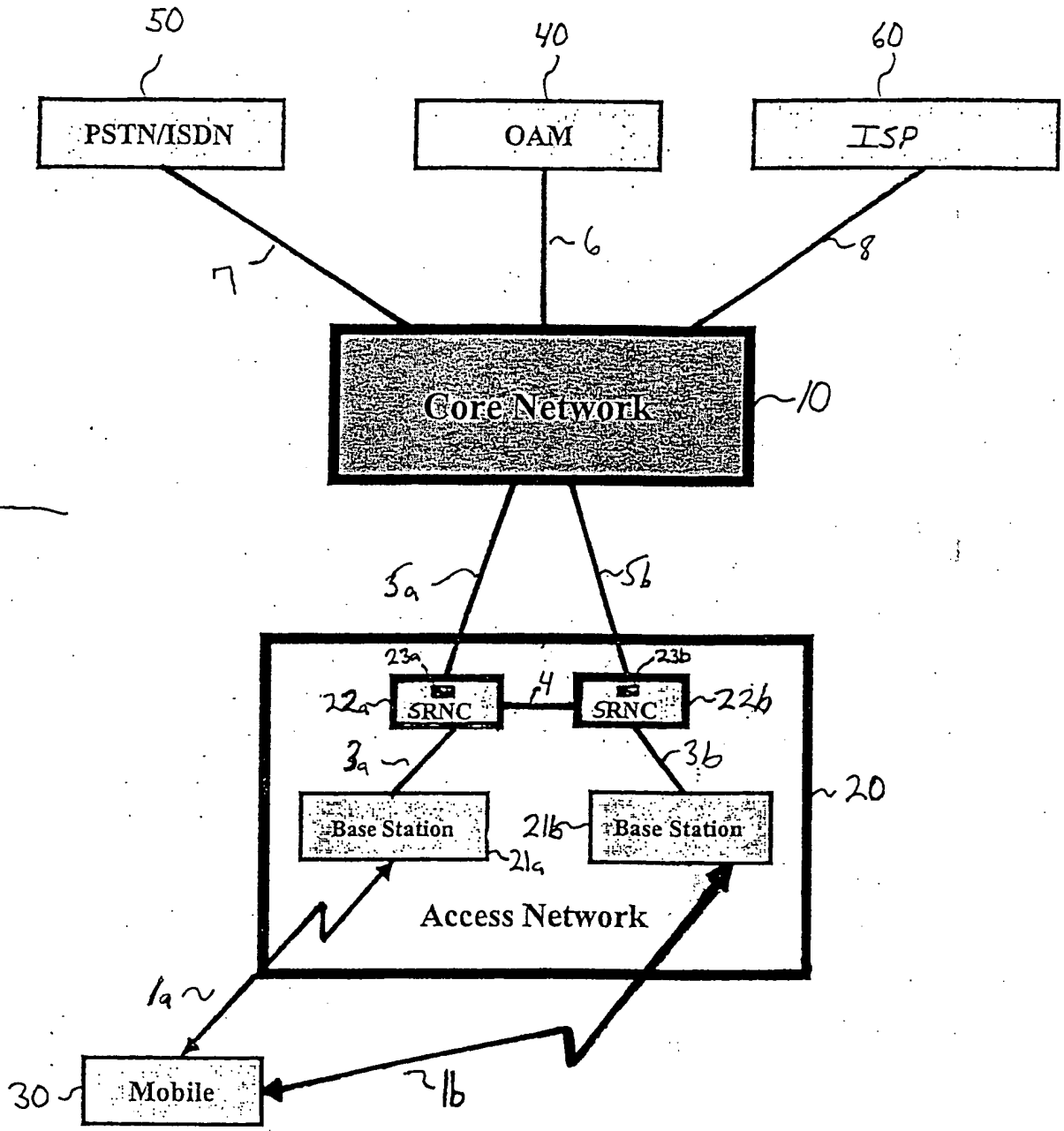

FIG. 1

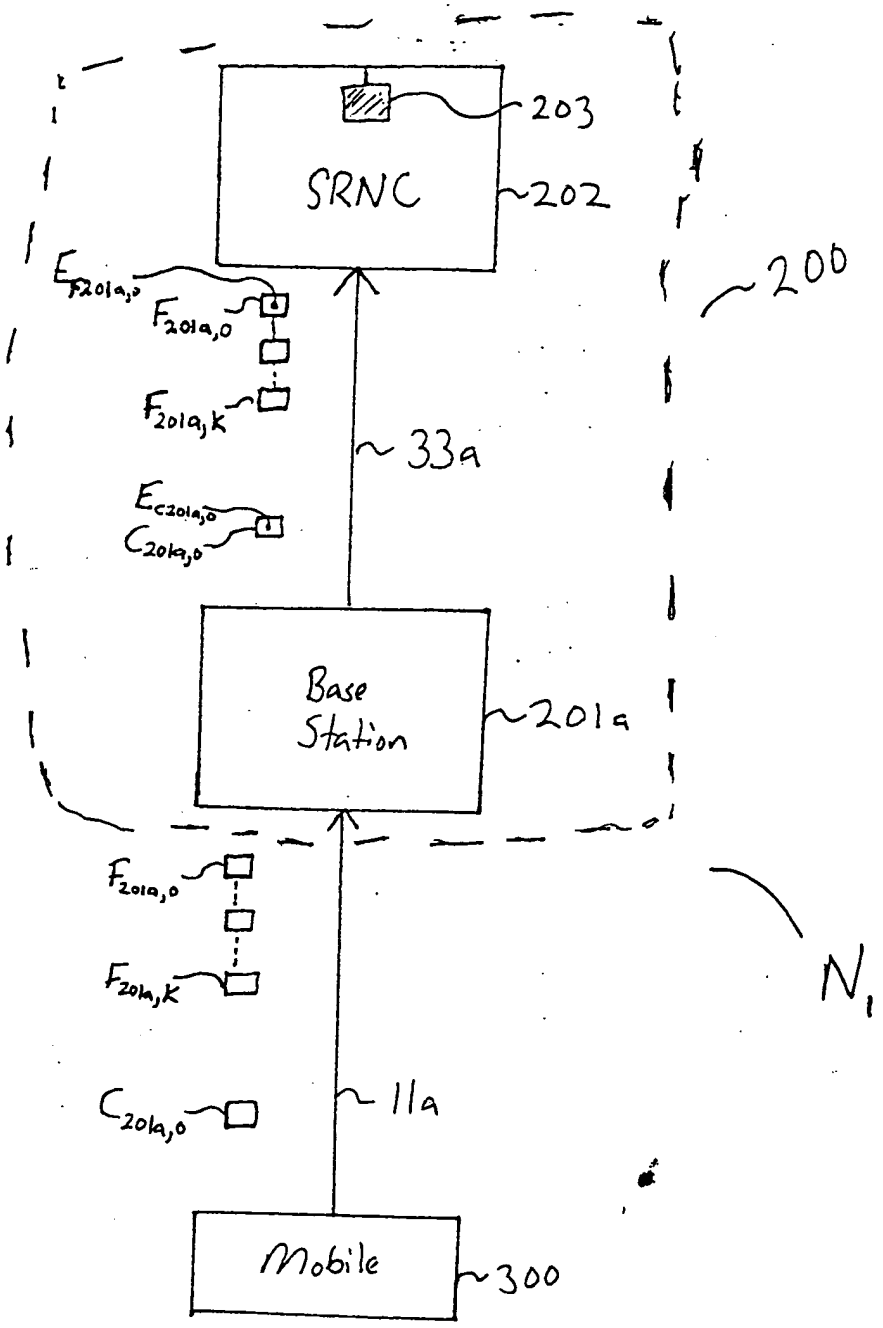

FIG. 2

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OIPE JC190
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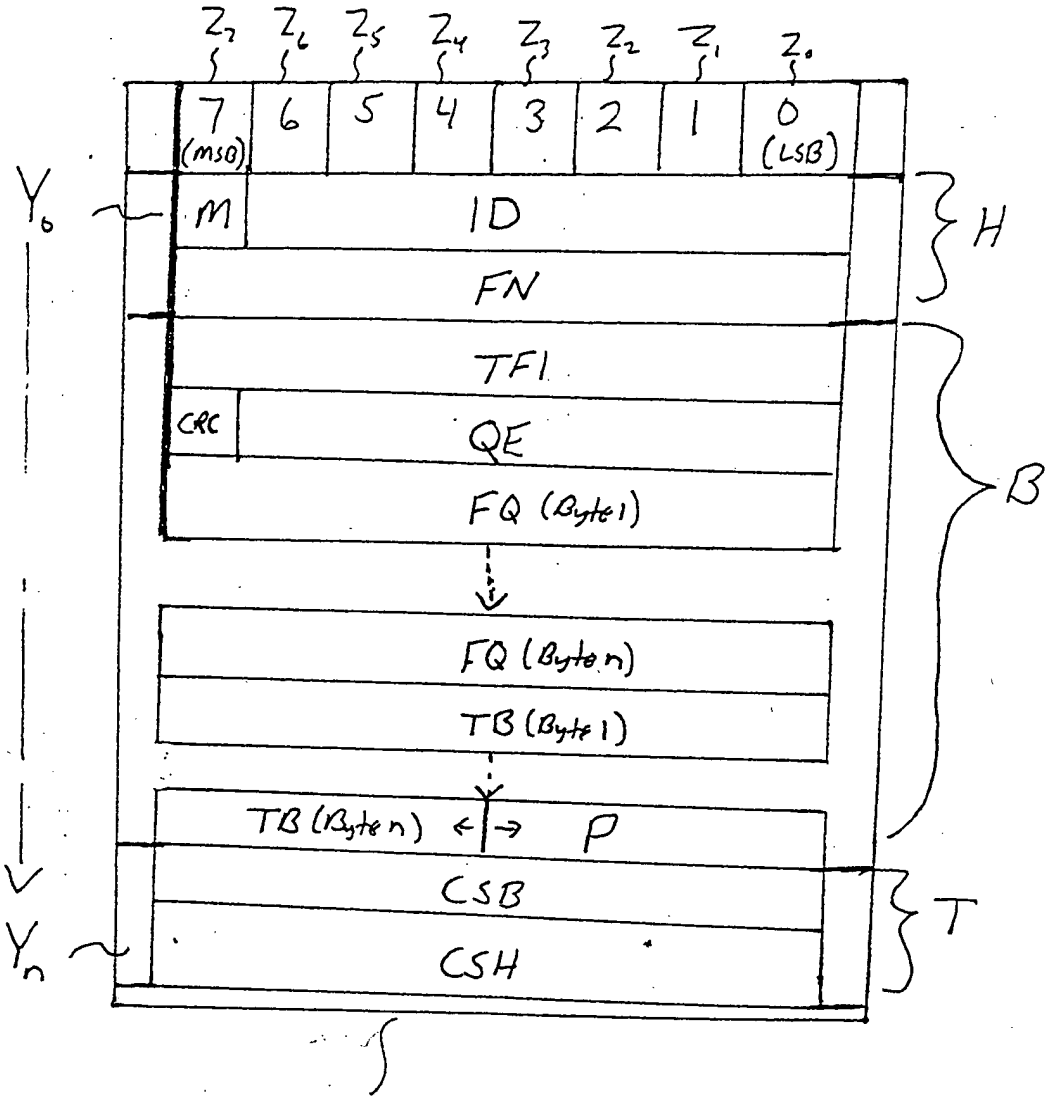

$F_{201a,0}$

FIG.3

OIPE JC190
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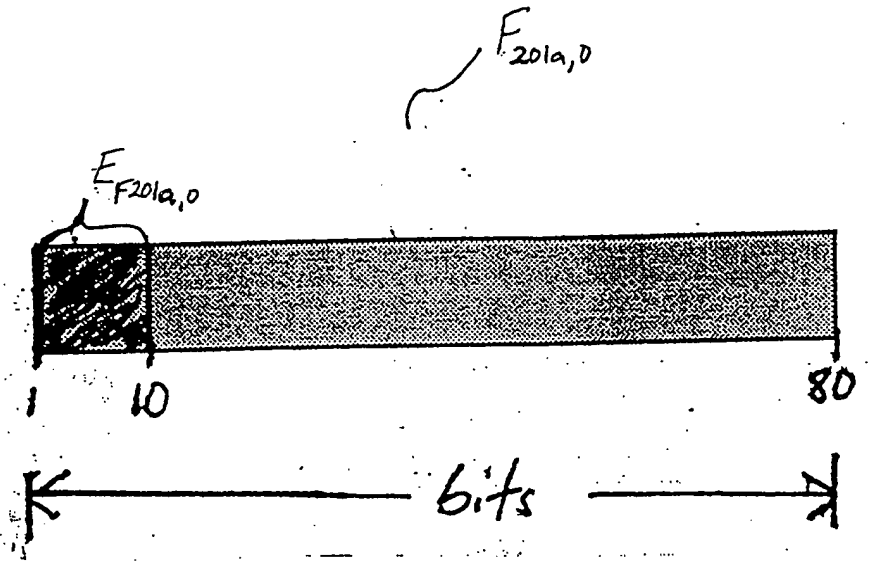

FIG. 4

OIPE JC1 30
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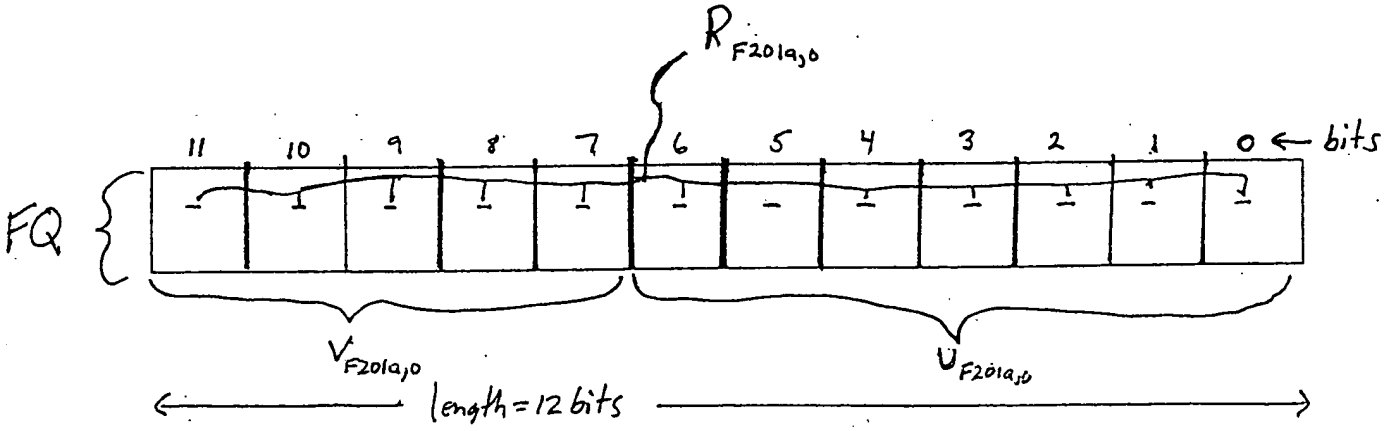

FIG.5

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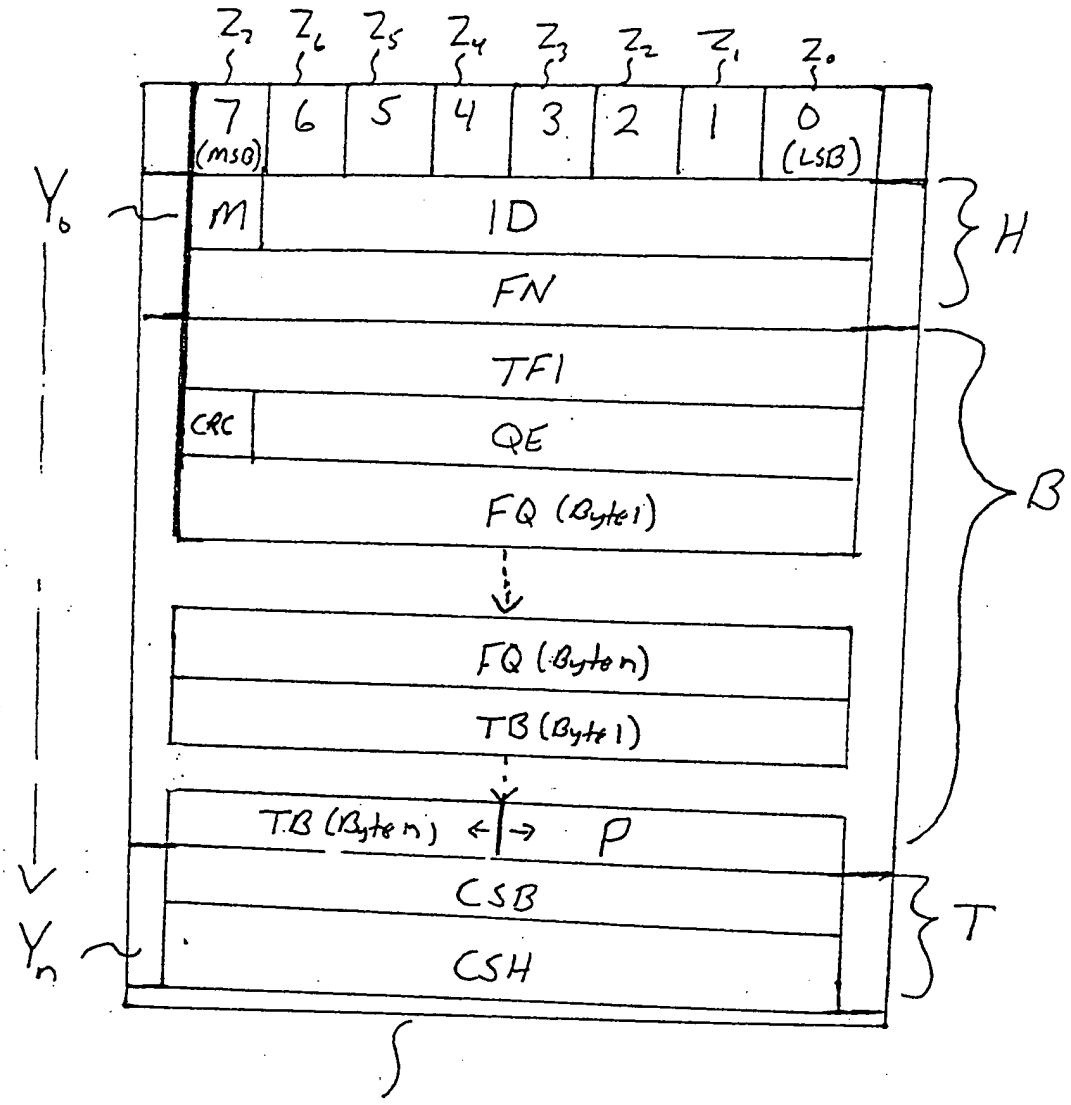

FIG. 6

OIPE JC190
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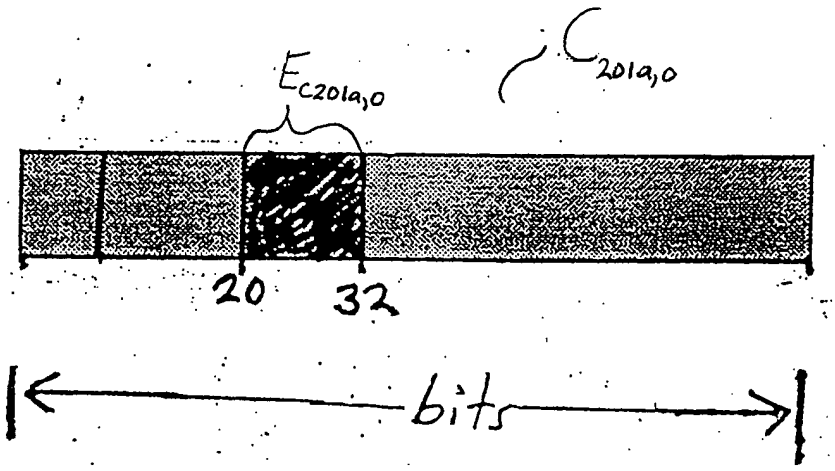

FIG. 7

OIPE JC180
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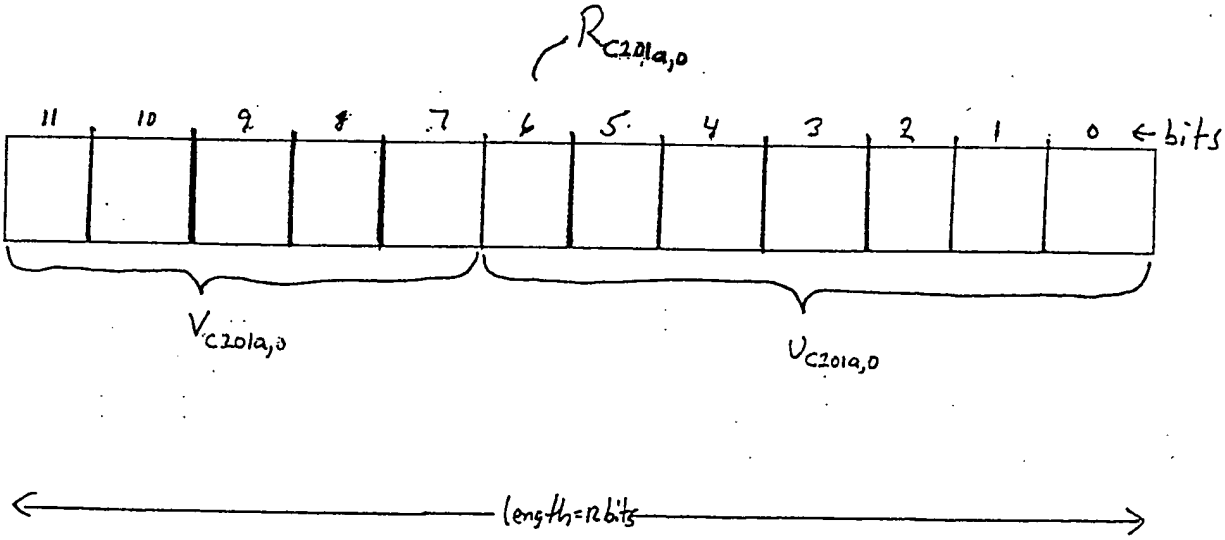

FIG. 8

OIPE JC130
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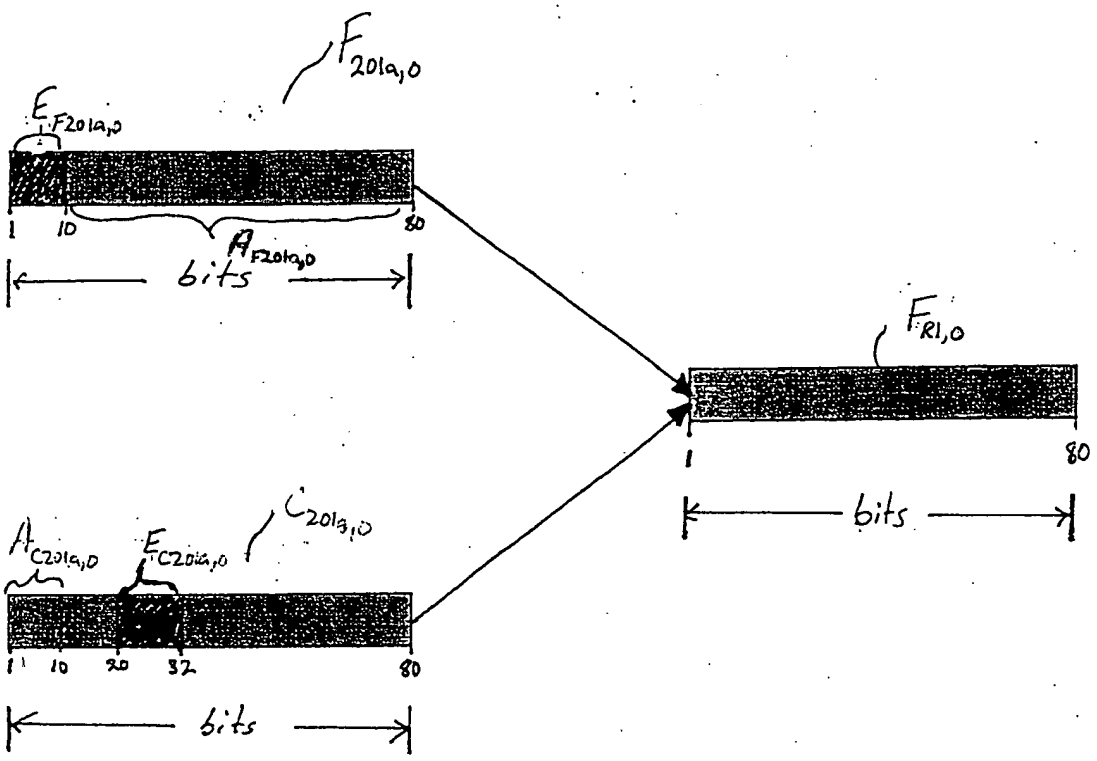

FIG. 9

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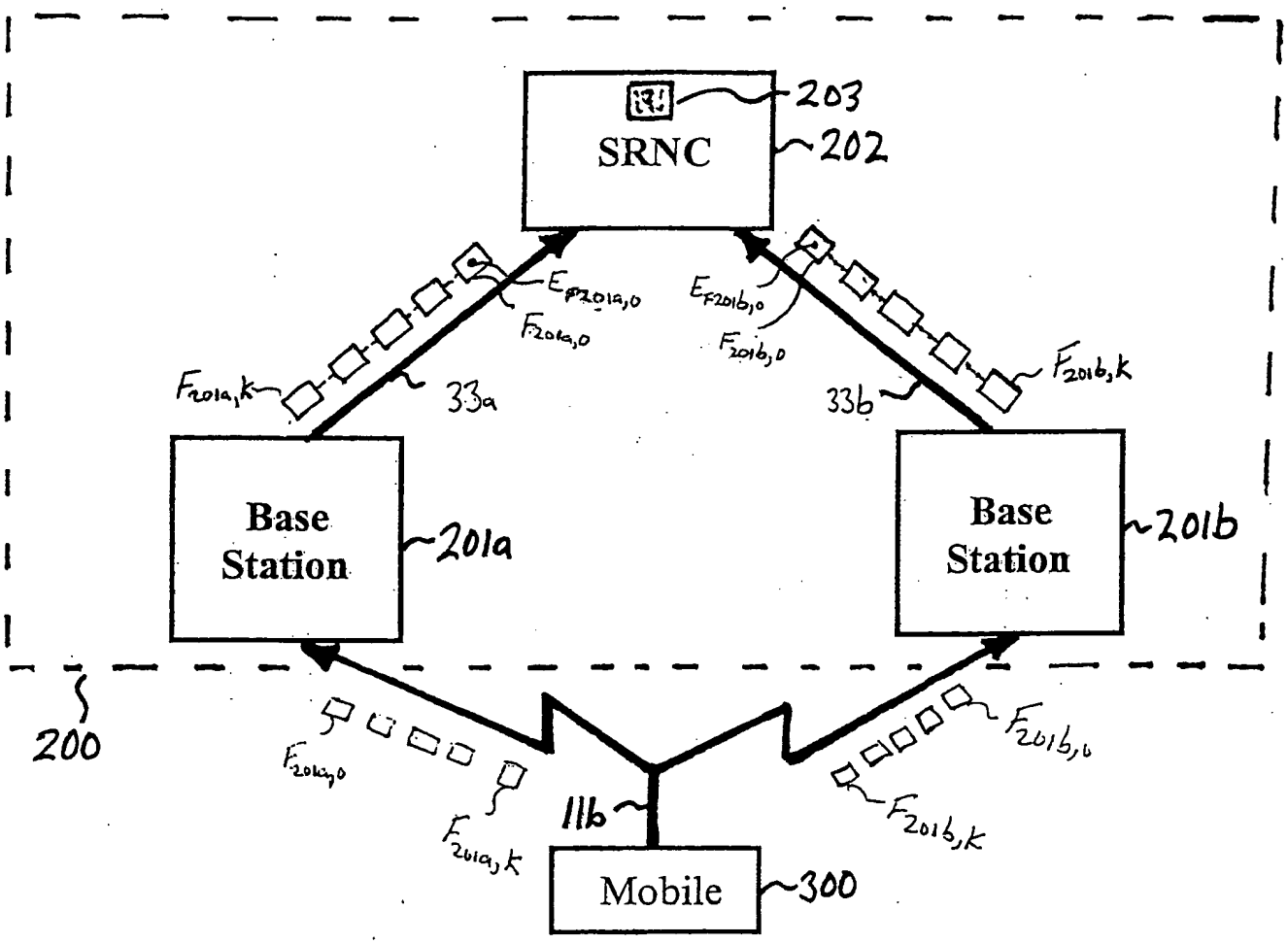

FIG. 10

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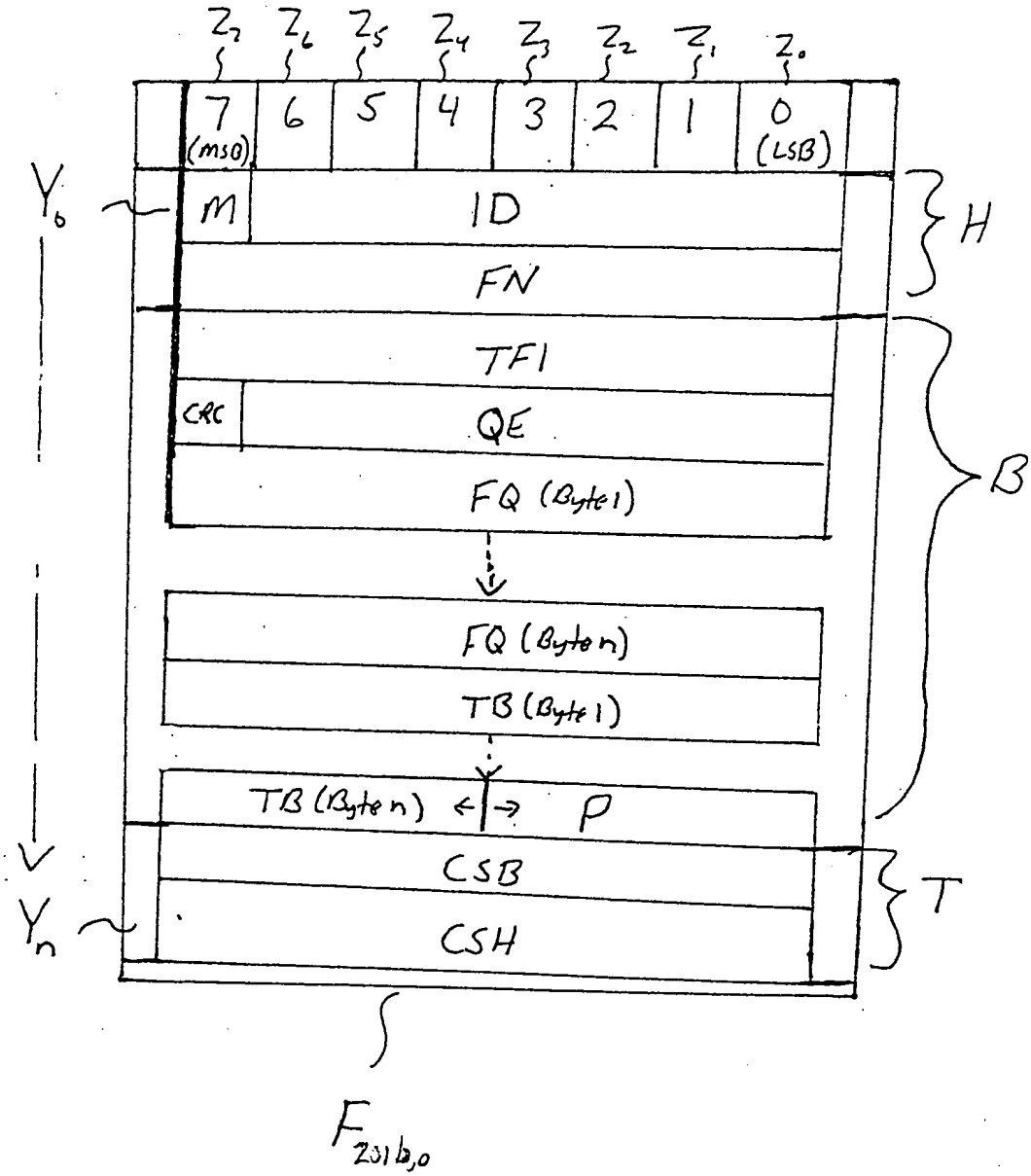

FIG. 11

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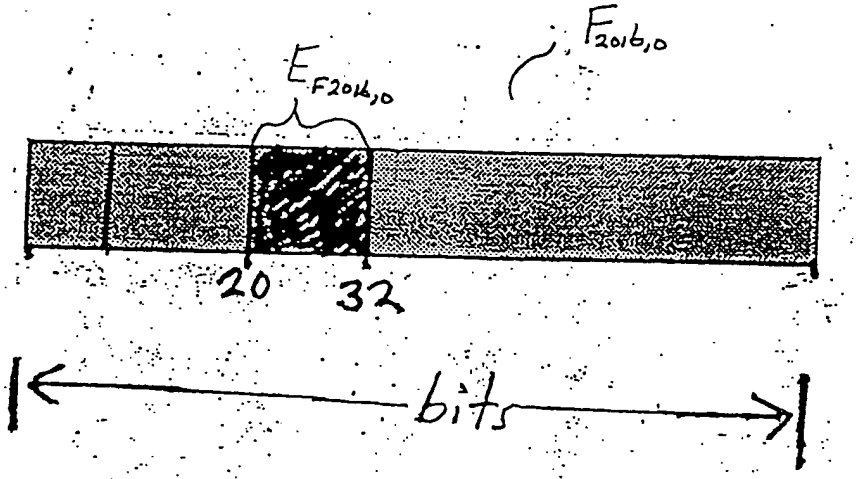

FIG. 12

OIPE JC130 OCT 25 2004 PATENT & TRADEMARK OFFICE

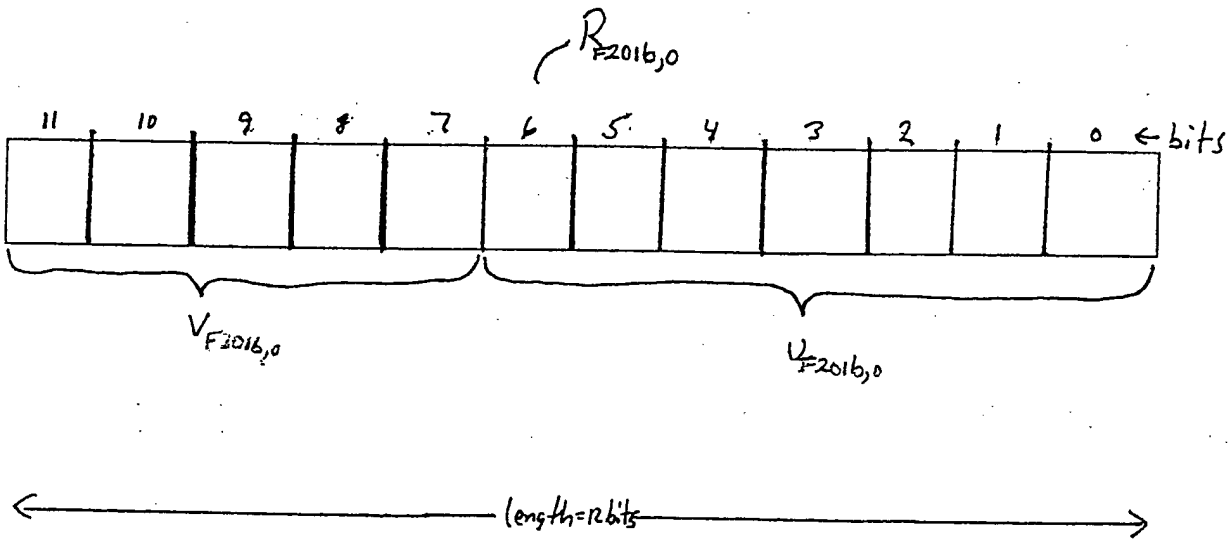

FIG. 13

OIPE JC130
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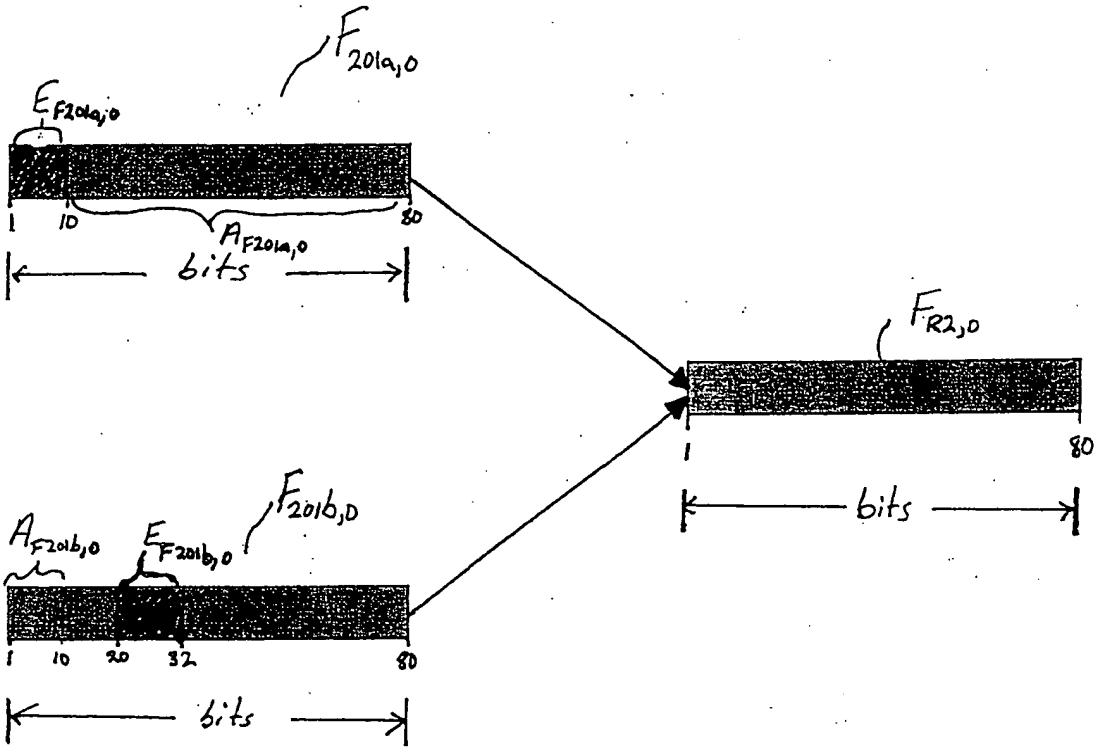

FIG. 14

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